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Pacific Marine Science Report 76-1

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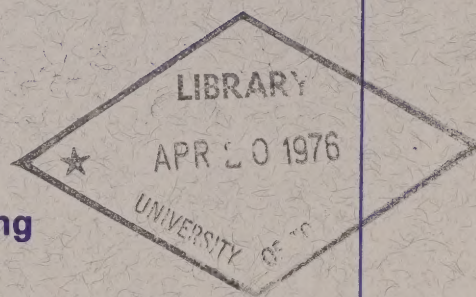
**OCEANOGRAPHIC OBSERVATIONS
AT OCEAN STATION P
(50° N, 145° W)**

VOLUME 64

10 January – 19 February 1975

by

B.L. Twaites, K.A. Coates, C. de Jong



**INSTITUTE OF OCEAN SCIENCES, PATRICIA BAY
Victoria, B.C.**

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Pacific Marine Science Report 76-1

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INTRODUCTION

Continued operation of Ocean Weather Station Papa, located 35°45'N, 159°50'W, was inaugurated in December, 1955. The station is now used primarily to make meteorological observations of the surface and lower atmosphere and to provide an air-sea communication system. The station is owned by the Canada Department of Transport, and is operated by the Marine Service Branch of the Ministry of Transport. They are the only weather and sea state station in the Pacific Ocean for a period of six weeks, and is then followed by the station ship, the Albatross, a continuous watch.

Bathymographic observations have been made at Station Papa since July, 1952. A program of such extensive bathymographic observations commenced in August, 1955. This was suggested in April, 1954, by the addition of a number of oceanographic stations along the coast of British Columbia and Alaska. These stations are known as Line F stations. The number of stations on Line F has been increased since and the position of each station (Fig. 1). Bathymographic observations are made with a bathythermograph, in addition to being made on other oceanographic stations, are also made on other stations at 40', 100', 150', 200', 250', 300', 350', 400', 450', 500', 550', 600', 650', 700', 750', 800', 850', 900', 950', 1000', 1100', 1200', 1300', 1400', 1500', 1600', 1700', 1800', 1900', 2000', 2100', 2200', 2300', 2400', 2500', 2600', 2700', 2800', 2900', 3000', 3100', 3200', 3300', 3400', 3500', 3600', 3700', 3800', 3900', 4000', 4100', 4200', 4300', 4400', 4500', 4600', 4700', 4800', 4900', 5000', 5100', 5200', 5300', 5400', 5500', 5600', 5700', 5800', 5900', 6000', 6100', 6200', 6300', 6400', 6500', 6600', 6700', 6800', 6900', 7000', 7100', 7200', 7300', 7400', 7500', 7600', 7700', 7800', 7900', 8000', 8100', 8200', 8300', 8400', 8500', 8600', 8700', 8800', 8900', 9000', 9100', 9200', 9300', 9400', 9500', 9600', 9700', 9800', 9900', 10000'. These stations are known as Line F stations. Bathymographic observations are also made on other stations at 40', 100', 150', 200', 250', 300', 350', 400', 450', 500', 550', 600', 650', 700', 750', 800', 850', 900', 950', 1000', 1100', 1200', 1300', 1400', 1500', 1600', 1700', 1800', 1900', 2000', 2100', 2200', 2300', 2400', 2500', 2600', 2700', 2800', 2900', 3000', 3100', 3200', 3300', 3400', 3500', 3600', 3700', 3800', 3900', 4000', 4100', 4200', 4300', 4400', 4500', 4600', 4700', 4800', 4900', 5000', 5100', 5200', 5300', 5400', 5500', 5600', 5700', 5800', 5900', 6000', 6100', 6200', 6300', 6400', 6500', 6600', 6700', 6800', 6900', 7000', 7100', 7200', 7300', 7400', 7500', 7600', 7700', 7800', 7900', 8000', 8100', 8200', 8300', 8400', 8500', 8600', 8700', 8800', 8900', 9000', 9100', 9200', 9300', 9400', 9500', 9600', 9700', 9800', 9900', 10000'.

ABSTRACT

Physical, chemical and biological oceanographic observations are made from the weather ship at Ocean Weather Station Papa, and between Esquimalt and Station Papa, on a routine continuing basis. Physical oceanography data only are shown, including profiles obtained with bottle casts, conductivity-temperature-pressure instruments, and mechanical and expendable bathythermographs. Surface observations are also shown.

Abstracts and summaries of data are published in the Summary Report Series of the Fisheries Research Board of Canada (1955). The station, Esquimalt, British Columbia, Canada. Requests for these data should be directed to the.

For the physical data see the Ocean Chemistry Group, Esquimalt and Station Papa, Esquimalt, Canada. Tel. 120. Esquimalt, British Columbia, Canada.

INTRODUCTION

Canadian operation of Ocean Weather Station P (Latitude 50°00'N, Longitude 145°00'W) was inaugurated in December, 1950. The station is occupied primarily to make meteorological observations of the surface and upper air and to provide an air-sea rescue service. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the *CCGS VANCOUVER* and the *CCGS QUADRA*. Each ship remains on station for a period of six weeks, and is then relieved by the alternate ship, thus maintaining a continuous watch.

Bathythermograph observations have been made at Station P since July, 1952. A program of more extensive oceanographic observations commenced in August, 1956. This was extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections, in addition to being made on Line P oceanographic stations, are also made at odd meridians at 40', i.e., 139°40'W, 141°40'W, etc. These stations are known as Line P BT stations. Data observed prior to 1968 has been indexed by Collins *et al.* (1969).

The present record includes hydrographic, bathythermograph and continuously sampled STP data collected from the *CCGS VANCOUVER* during the period 10 January to 19 February 1975.

All physical oceanographic data have been stored by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), Biological Station, Nanaimo, British Columbia, Canada. Requests for these data should be directed to FRB.

Marine geochemical data are for the Ocean Chemistry Group, Ocean and Aquatic Sciences, Environment Canada, 512 - 1230 Government Street, Victoria, British Columbia, Canada.

PROGRAM OF OBSERVATIONS FROM CCGS VANCOUVER, 10 JANUARY - 19 FEBRUARY 1975
(CODC REF. NO. 15-75-001)

Oceanographic observations were made by Mr. B.L. Twaites and Ms. K.A. Coates of Chemex Labs Ltd., North Vancouver, B.C.

En route to Station P, Line P stations 1-5 were occupied and an STP profile made to near bottom or 1500 metres.

Salinity, nitrate, nutrient, alkalinity and total CO₂ samples were taken from the seawater loop at stations 1-6.

All other stations were missed due to adverse weather conditions.

With the exception of stations 8 and 9, mechanical BT or XBT's were taken at all other Line P and BT stations.

Tarball tows were made at stations 3 and 5. The thermosalinograph and PCO₂ systems were operated only during part of Line P, and shut down because of poor weather. The surface temperature recorder was run continuously.

At Station P the oceanographic program was carried out as follows:

I. Physical Oceanography

- 1) Profiles of salinity, temperature and oxygen were obtained from 6 hydrographic stations to near bottom (4200 metres).
- 2) 8 STP profiles to 1500 metres and 16 to 300 metres were obtained.
- 3) BT's were taken every three hours to coincide with meteorological observations, encoded and transmitted according to the IGOSS format.
- 4) Salinity samples daily at 0000 hrs GMT from the seawater loop.

II. Marine Geochemistry

- 1) Samples for nutrients, tritium, alkalinity and total CO₂ were obtained from 6 depths to 500 metres. Nutrient, phosphate and salinity samples were also collected daily at 0000 hrs GMT and once every hour for a 24 hour period from the seawater loop.
- 2) Alkalinity and total CO₂ samples every 3 days from the seawater loop.
- 3) Air CO₂ samples weekly in quadruplicate.
- 4) 2 seawater C-14 samples were extracted from the seawater loop.
- 5) 4 surface tarball tows were made at a speed of 4 knots. The duration of each tow was approximately 15 minutes.
- 6) The PCO₂ system was operated on 27 days, the other days being too rough for continuous operation of the seawater loop.

III. Biological and Productivity

Samples were obtained as follows:

- 1) 17 - 150 metre vertical plankton hauls.
- 2 - 1200 metre vertical plankton hauls.
- 9 - Surface plankton tows for 10 minutes at sundown.
- 24 - Micro and nano organism samples filtered from the seawater loop.
- 2) Samples for plant pigment, nitrate and C_{14} productivity were obtained from 3 stations to 200 metres.
- 3) Approximately 200 salmon were caught.

En route from Station P only Line P station 7 was occupied and an STP profile made to 1500 metres. Salinity samples were taken at all Line P stations with a bucket.

All other stations were missed due to adverse weather conditions. The thermosalinograph was run only when the seawater loop was operational. The surface temperature recorder was run continuously.

Mechanical or XBT's were taken at all Line P or BT stations.

IV. Observations for Other Agencies

- 1) Marine mammal observations were made by the ship's officers for Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C., Canada.
- 2) Bird observations were made by the ship's officers for Dr. M. Myres, University of Alberta, Calgary, Alberta, Canada.
- 3) Storm effects experiment for Dr. M. Miyake, University of British Columbia, Vancouver, B.C., Canada.

Data was processed for publication by Messrs. C. de Jong, B. Minkley and E. Luscombe.

OBSERVATIONAL PROCEDURES

Temperatures at depth were measured by deep-sea-reversing thermometers of Richter and Wiese and/or Yochino Keiki Co. manufacture. Two protected thermometers were used on all Niskin bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be $\pm 0.02^{\circ}\text{C}$.

Surface water temperatures were measured from a bucket sample using a deck thermometer of $\pm 0.1^{\circ}\text{C}$ accuracy.

Salinity determinations were made aboard ship with either an Auto-lab Model 601 Mark III inductive salinometer or a Hytech Model 6220 lab salinometer. Accuracy using duplicate determinations is estimated to be ± 0.003 ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of ± 5 m for depths less than 1000 m, and $\pm 0.5\%$ of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Line P engine intake continuous temperatures were recorded by a Honeywell Elektronik 15 Recorder. The temperature probe is at a depth of approximately 3 metres below the sea surface and the instrument accuracy is believed to be $\pm 0.1^{\circ}\text{C}$.

Each ship is equipped with a Plessey Model 6600-T thermosalinograph which is used, on Line P, for continuous recording of surface temperatures and salinities from the ship's seawater loop. The temperature probe is mounted at the seawater loop intake (approximately 3 metres below the surface) and the salinity probe and recorder are situated in the dry lab. The accuracy of this instrument is believed to be $\pm 0.1^{\circ}\text{C}$ for temperature and ± 0.1 ppt for salinity.

STP profiles were taken with a Guildline Model 8101 STP system.

COMPUTATIONS

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the depth difference method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 565 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity, and dissolved oxygen vs \log_{10} depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Data values which we suspect but which we have included in this data record are indicated with a plus. These data have been removed from punch card and magnetic tape records.

Analog records from the salinity-temperature-pressure instrument have been machine digitized, then replotted using the Calcomp plotter.

Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (degrees Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in metres
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of 10^8 ergs/cm ²
OXY	is the concentration of dissolved oxygen expressed in millilitres per litre
B-V PERIOD	is the Brunt-Vaisala period in minutes.

REFERENCES

- Carpenter, J.H., 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. *Limnol. and Oceanogr.* 10: 141-143.
- Collins, C.A., R.L. Tripe, D.A. Healey and J. Joergensen, 1969. The time distribution of serial oceanographic data from the Ocean Station P programme. *Fish. Res. Bd. Can. Tech. Rept.* No. 106.
- Reiniger, R.F. and C.K. Ross, 1968. A method of interpolation with application to oceanographic data. *Deep-Sea Res.* 15: 185-193.
- U.S.N. Hydrographic Office, 1955. Instruction Manual for oceanographic observations, Publ. No. 607.

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- Figure 6 Temperature difference between hydro data and STP. P-75-1

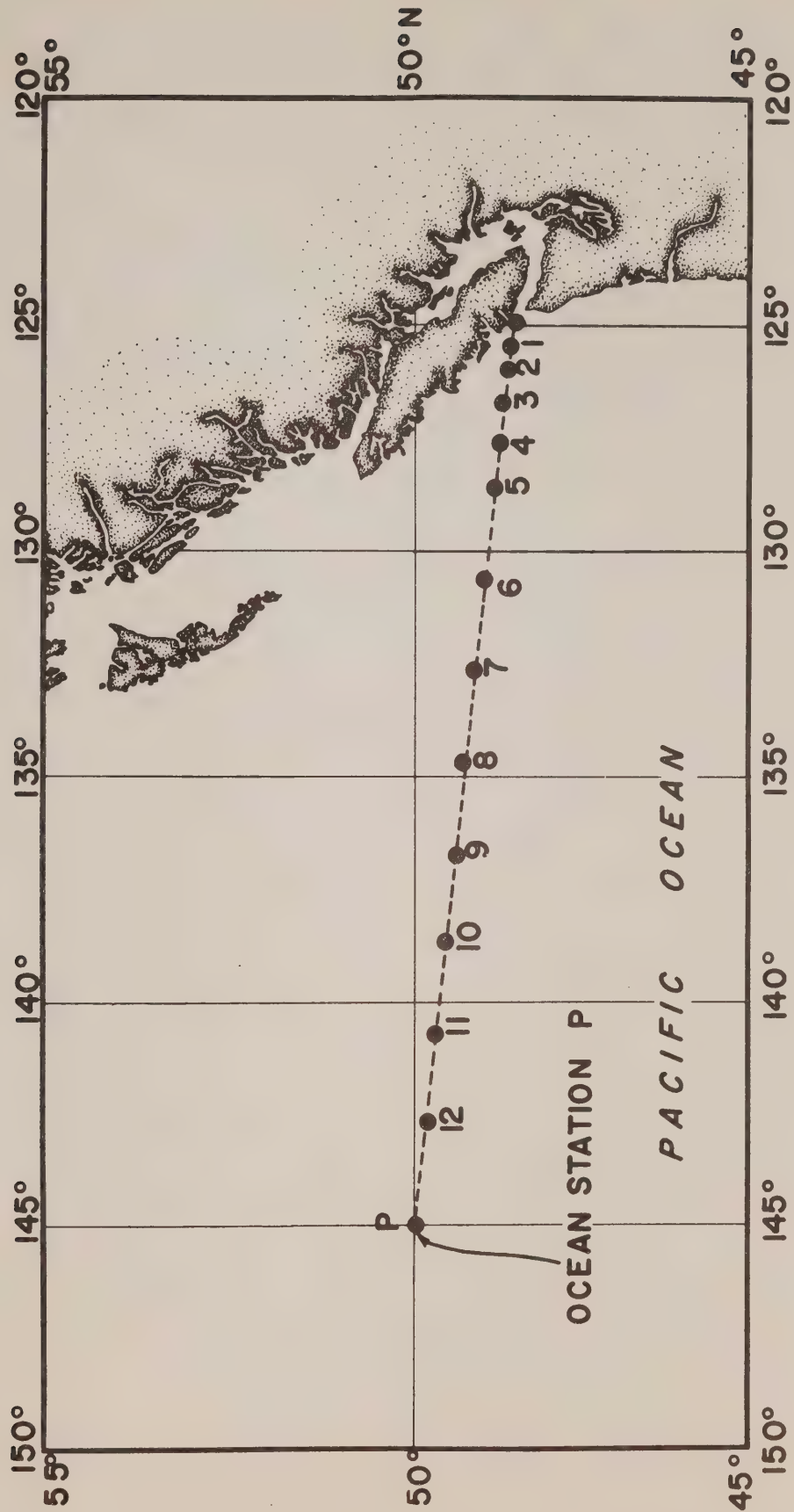


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-75-1
(CODC REFERENCE NO. 15-75-001)

RESULTS OF HYDROGRAPHIC OBSERVATIONS
(P-75-1)

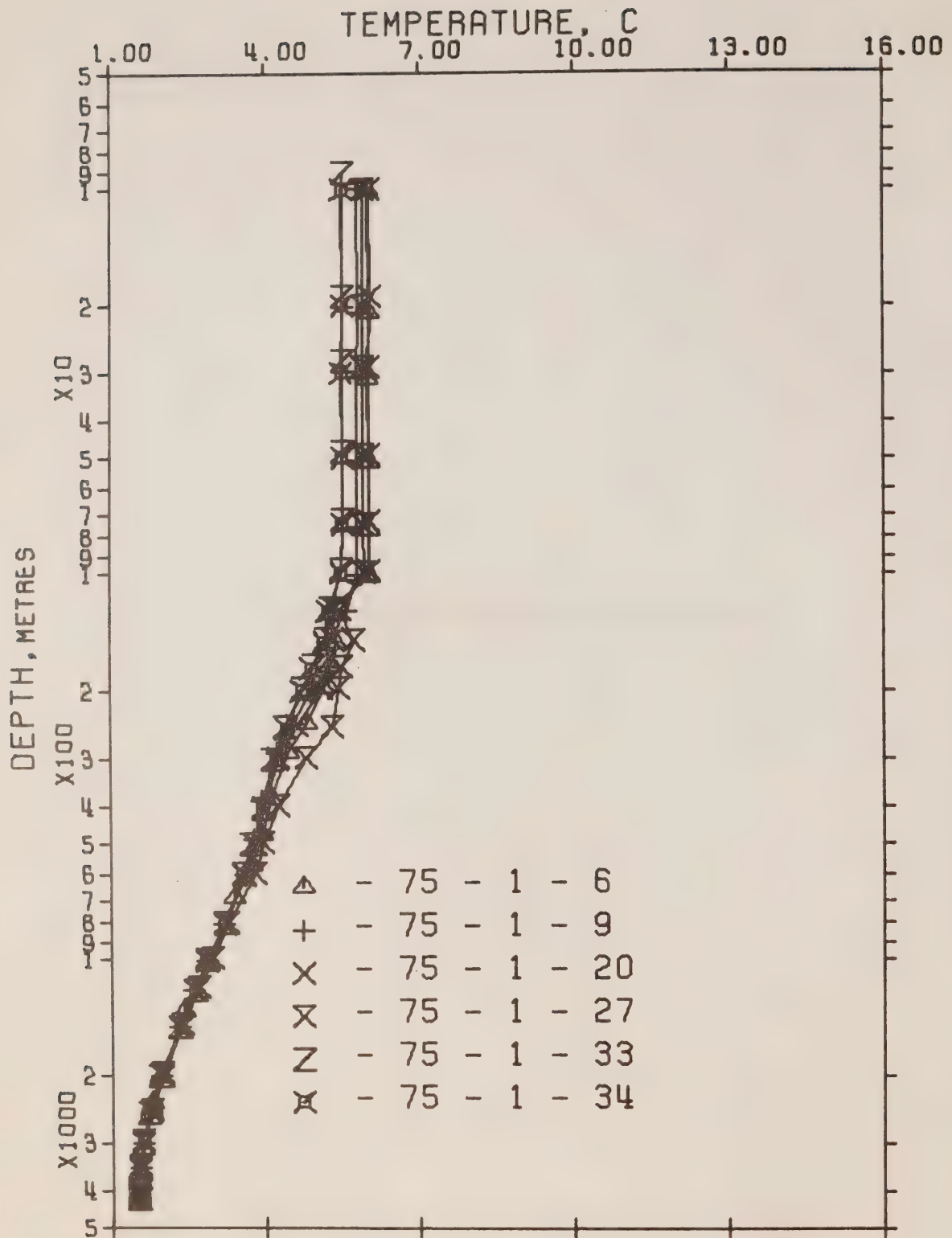


Figure 2. Composite plot of temperature vs log₁₀ depth. P-75-1

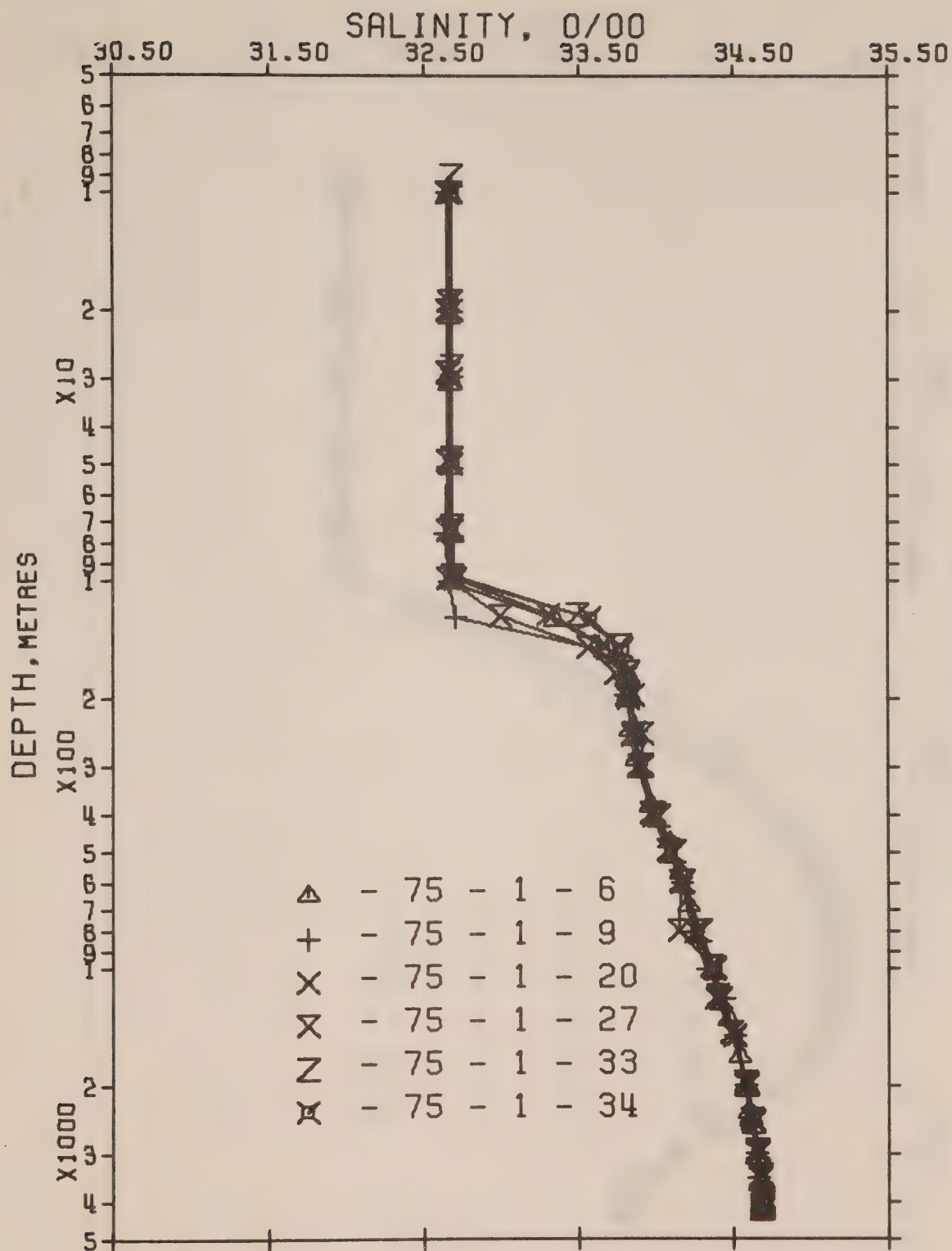


Figure 3. Composite plot of salinity vs \log_{10} depth. P-75-1

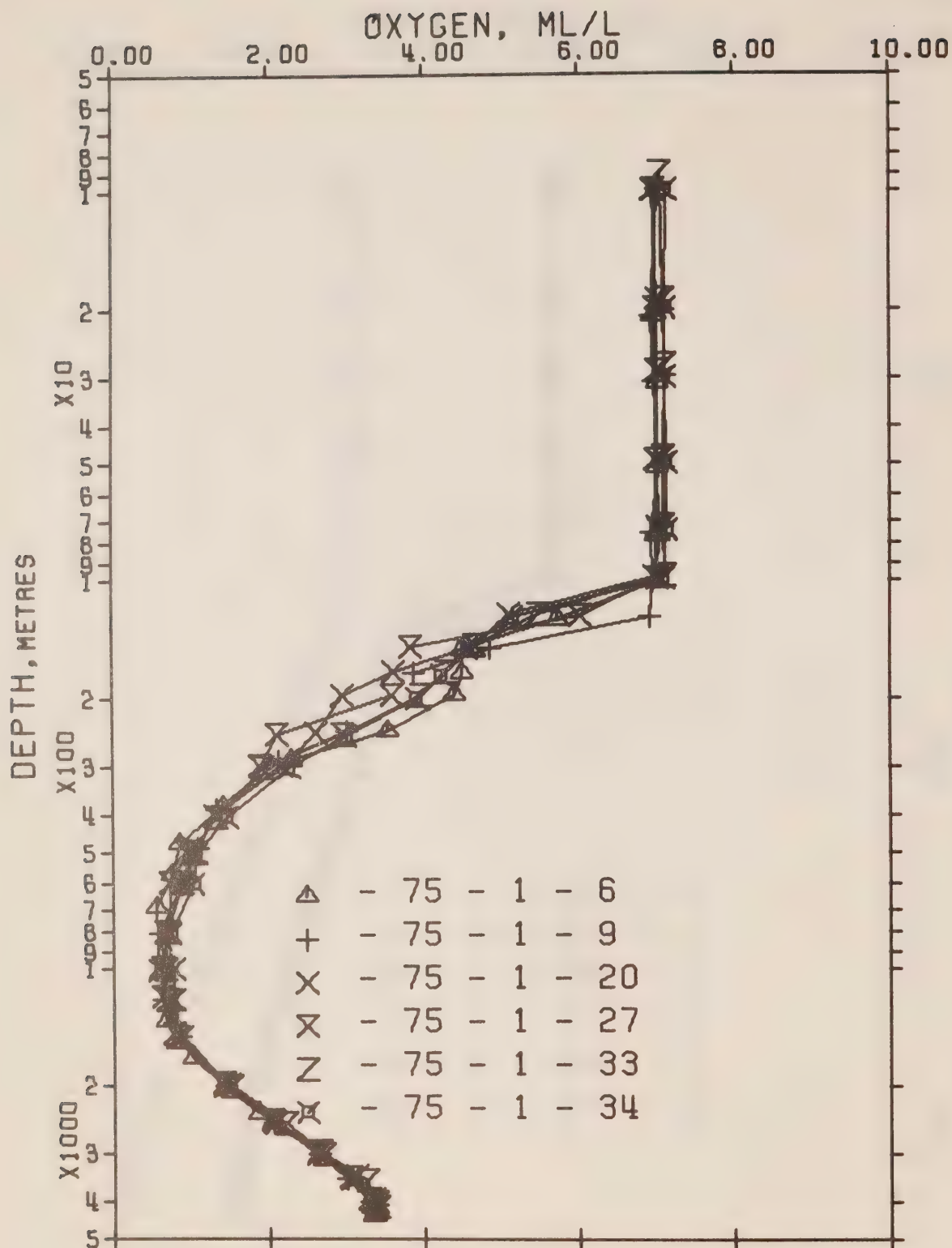
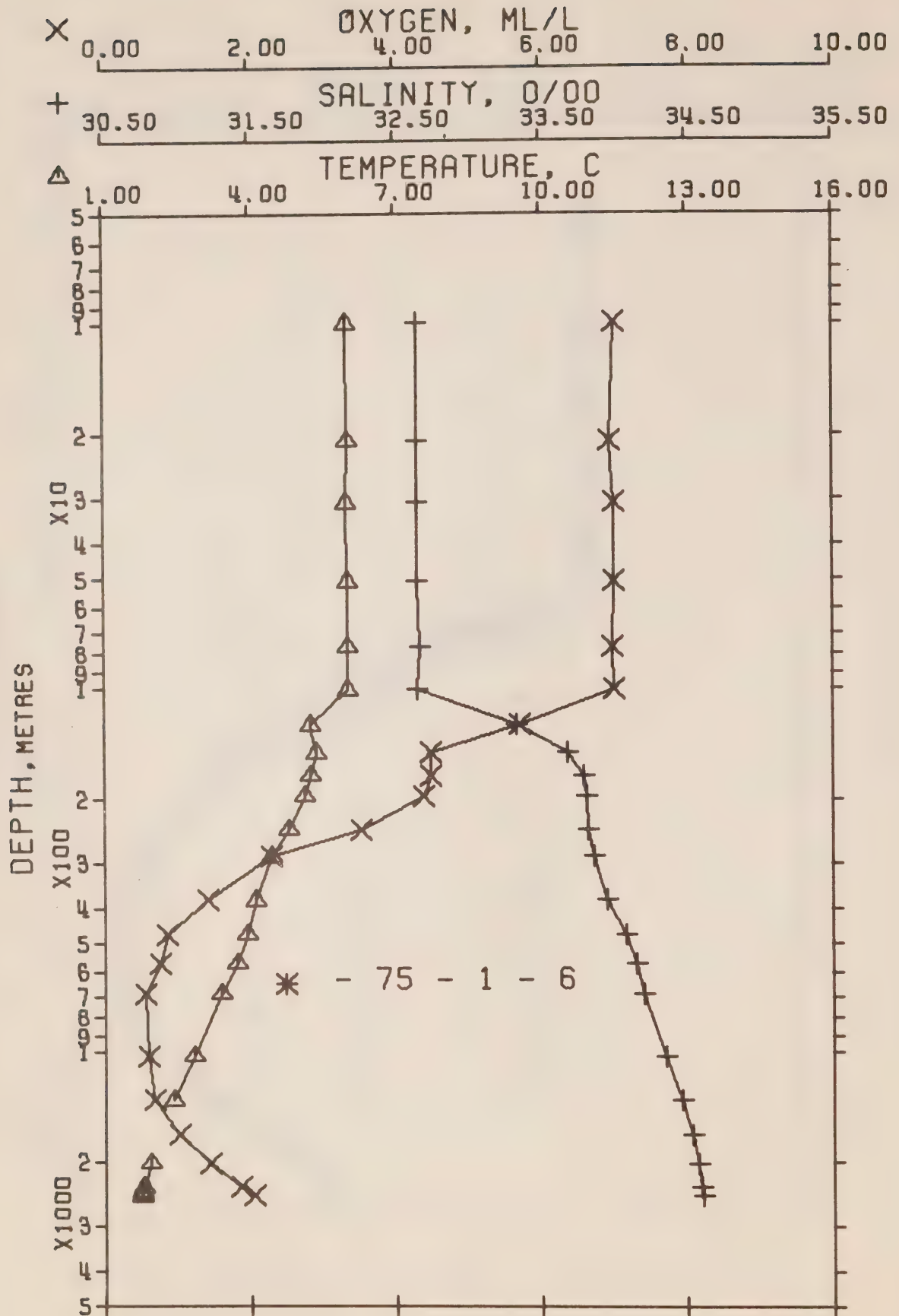


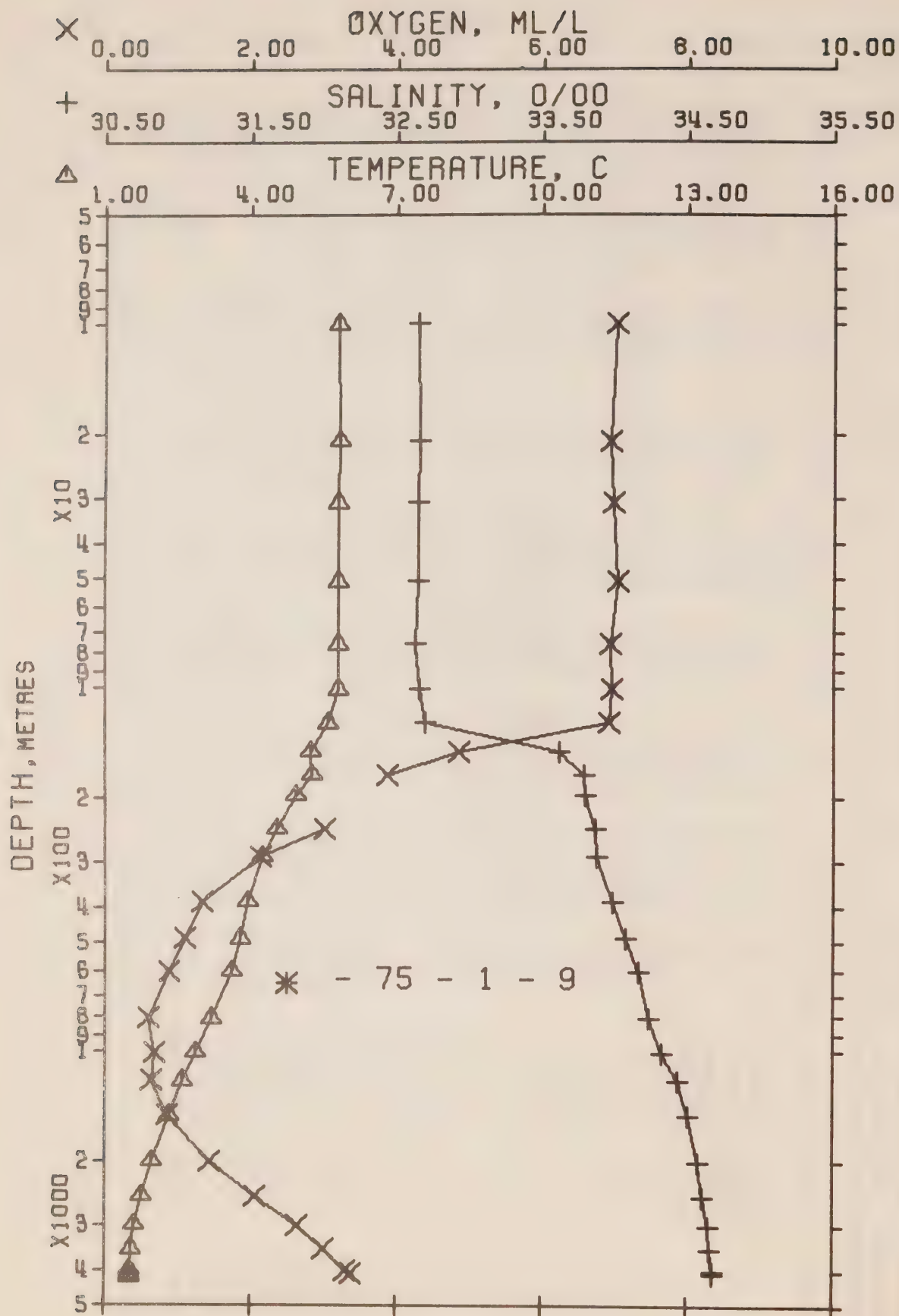
Figure 4. Composite plot of oxygen vs log₁₀ depth. P-75-1

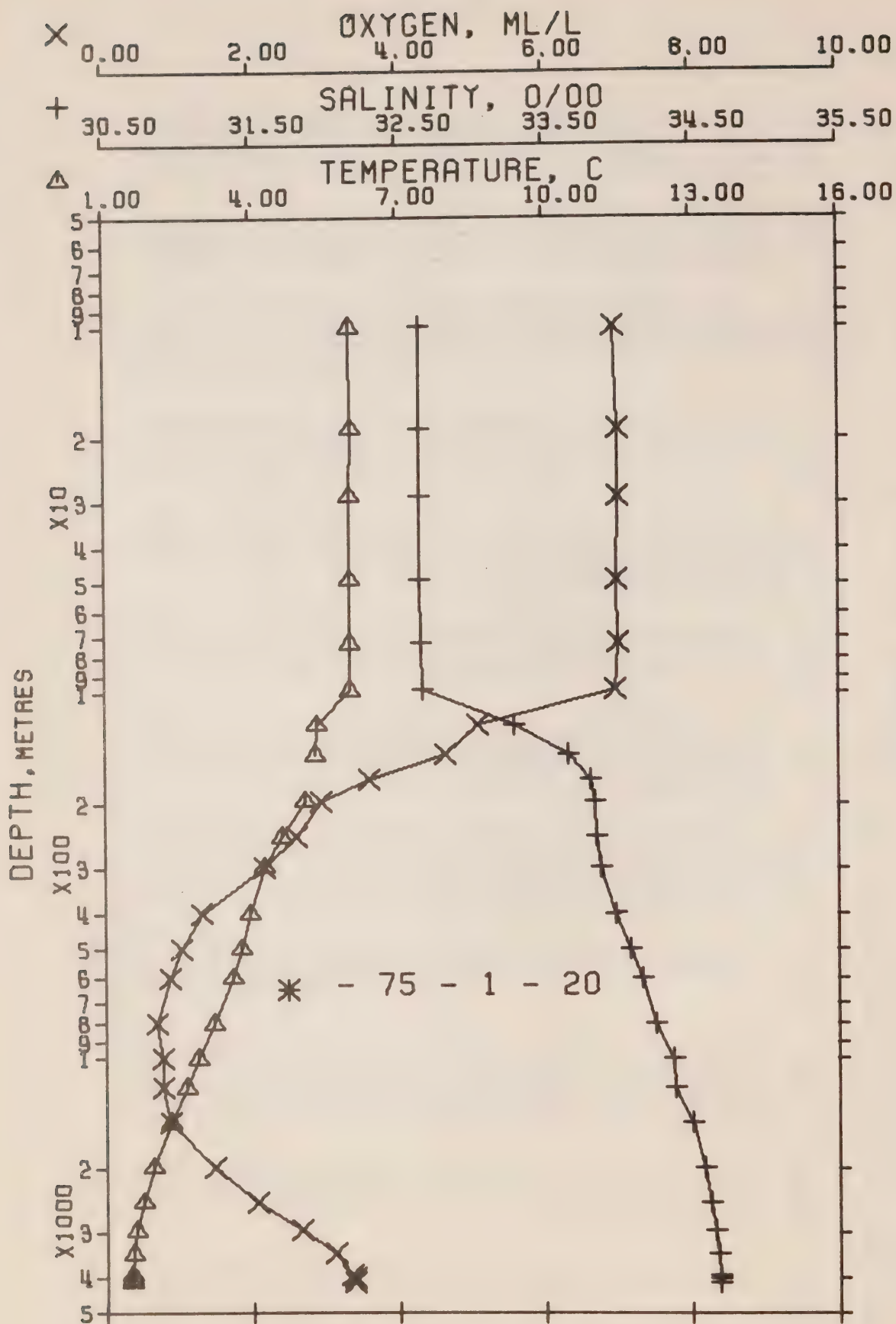


OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50- 0.0 N, 145- 0.0 W GMT 18.2
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75- 1- 6 DATE 14/ 1/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.05	32.662	0	25.726	227.9	6.05	227.7	0.0	0.0	7.01	1472.
10	6.02	32.657	10	25.726	228.0	6.02	227.7	0.23	0.01	7.01	1472.
21	6.04	32.660	21	25.726	228.1	6.04	227.7	0.48	0.05	6.96	1472.
31	6.02	32.660	31	25.728	228.1	6.02	227.4	0.71	0.11	7.02	1473.
51	6.03	32.658	51	25.725	228.5	6.03	227.7	1.17	0.31	7.01	1473.
77	6.03	32.679	77	25.742	227.2	6.02	226.0	1.77	0.70	7.01	1473.
102	6.04	32.661	101	25.727	228.9	6.03	227.5	2.33	1.21	7.01	1474.
127	5.25	33.336	126	26.354	169.6	5.24	168.0	2.83	1.80	5.73	1472.
151	5.38	33.687	150	26.616	145.1	5.37	143.0	3.21	2.33	4.50	1473.
174	5.26	33.796	173	26.716	135.8	5.25	133.5	3.53	2.86	4.50	1473.
198	5.15	33.825	197	26.752	132.6	5.13	130.1	3.85	3.48	4.41	1473.
245	4.81	33.832	243	26.796	128.8	4.79	125.9	4.46	4.85	3.53	1473.
291	4.44	33.870	289	26.867	122.3	4.42	119.1	5.04	6.44	2.30	1472.
383	4.11	33.958	380	26.971	113.0	4.08	109.2	6.12	10.15	1.43	1472.
476	3.94	34.089	472	27.093	102.2	3.91	97.6	7.12	14.51	0.86	1473.
573	3.73	34.158	568	27.169	95.5	3.69	90.4	8.07	19.61	0.76	1474.
694	3.40	34.213	688	27.245	88.8	3.35	83.0	9.19	26.82	0.55	1475.
1031	2.84	34.360	1021	27.414	74.0	2.77	67.0	11.91	50.75	0.59	1478.
1359	2.41	34.466	1354	27.535	63.4	2.32	55.3	14.21	78.91	0.69	1482.
1707	2.12*	34.536	1687	27.615	56.5	2.01	47.6	16.22	110.44	1.02	1486.
2044	1.93	34.579	2019	27.664	52.4	1.79	42.7	18.05	145.40	1.45	1491.
2383	1.78	34.605	2352	27.697	49.9	1.61	39.5	19.78	184.41	1.86	1496.
2451	1.75	34.609*	2419	27.702	49.5	1.58	39.0	20.12	192.76		1497.
2513	1.74	34.612	2479	27.705	49.3	1.56	38.6	20.42	200.40		1498.
2519	1.74	34.612*	2485	27.706	49.3	1.56	38.6	20.45	201.17	2.04	1498.



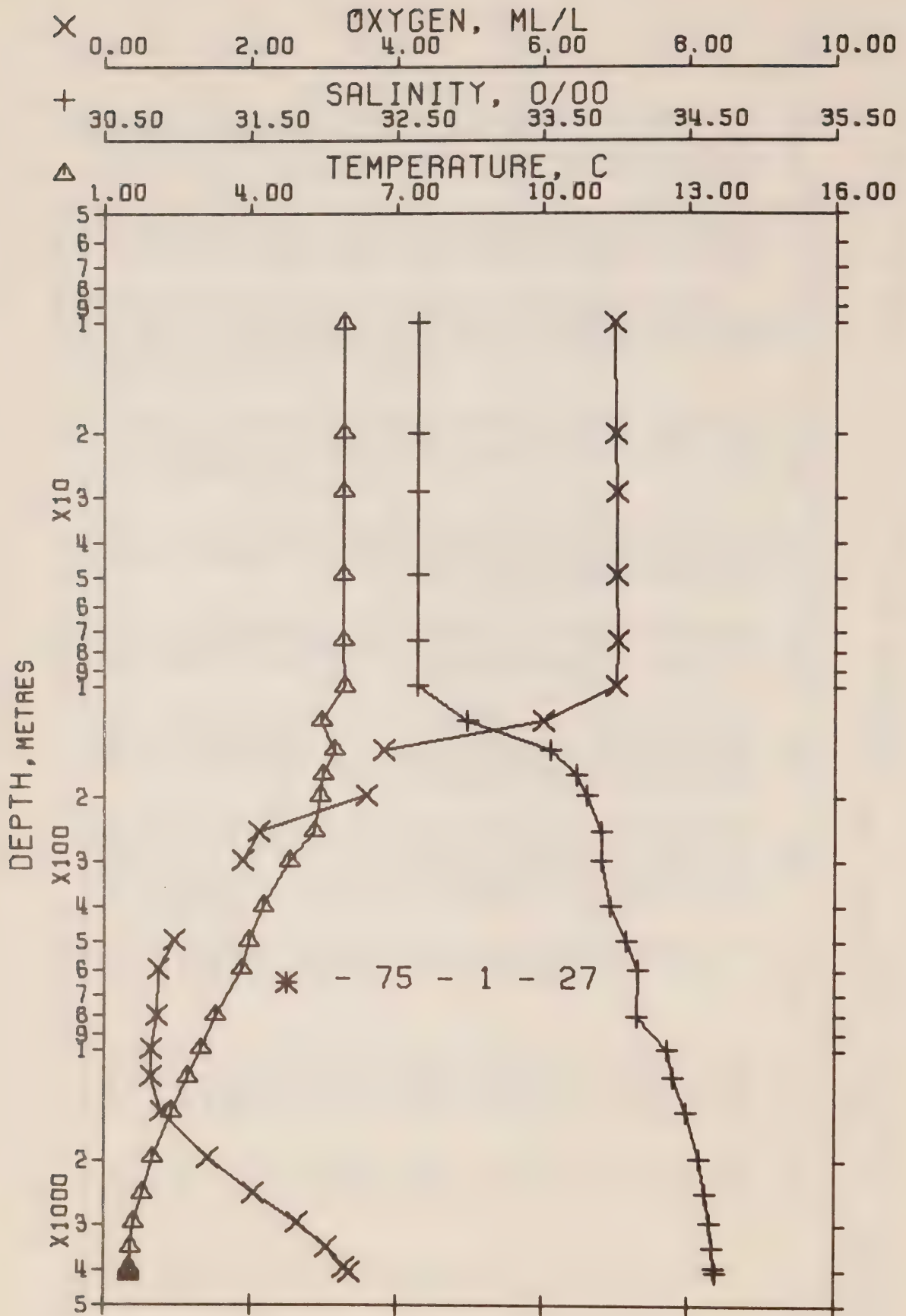


OFFSHORE OCEANOGRAPHY GROUP
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 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75- 1- 20

DATE 21/ 1/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.05	32.662	0	25.726	227.9	6.05	227.7	0.0	0.0	6.97	1472.
10	6.04	32.660	10	25.726	228.0	6.04	227.7	0.23	0.01	6.96	1472.
19	6.06	32.661	19	25.724	228.3	6.06	227.9	0.44	0.04	7.02	1473.
29	6.05	32.661	29	25.725	228.3	6.05	227.7	0.67	0.10	7.01	1473.
49	6.05	32.665	49	25.728	228.2	6.05	227.4	1.13	0.28	7.00	1473.
73	6.05	32.674	73	25.736	227.8	6.04	226.7	1.68	0.63	7.01	1473.
99	6.05	32.678	98	25.739	227.8	6.04	226.3	2.26	1.14	6.98	1474.
123	5.34	33.305	122	26.319	172.8	5.33	171.2	2.75	1.69	5.10	1472.
148	5.32	33.674	147	26.613	145.3	5.31	143.4	3.14	2.23	4.67	1473.
173	5.25*	33.818	172	26.735	134.0	5.23	131.7	3.49	2.80	3.62	1473.
198	5.11	33.849	197	26.775	130.3	5.09	127.8	3.92	3.43	2.96	1473.
249	4.63	33.859	247	26.837	124.7	4.61	121.9	4.46	4.90	2.62	1472.
300	4.28	33.891	298	26.900	119.0	4.26	115.9	5.09	6.65	2.18	1471.
402	3.96	33.994	399	27.015	108.9	3.93	105.0	6.25	10.80	1.32	1472.
504	3.79	34.091	500	27.110	100.6	3.75	96.0	7.31	15.73	1.05	1473.
606	3.61	34.173	601	27.193	93.4	3.57	88.1	8.30	21.32	0.89	1474.
307	3.22	34.254	800	27.302	83.9	3.16	77.5	10.08	34.14	0.71	1476.
1011	2.89	34.382	1001	27.427	72.9	2.82	65.7	11.67	48.79	0.77	1478.
1213	2.64	34.390	1201	27.455	70.7	2.56	62.9	13.12	65.28	0.77	1480.
1515	2.31	34.515	1493	27.583	59.3	2.21	50.7	15.08	92.51	0.88	1484.
2015	1.95	34.594	1990	27.675	51.4	1.81	41.8	17.79	141.42	1.47	1491.
2511	1.75	34.630	2477	27.719	48.1	1.57	37.3	20.25	198.11	2.07	1498.
3005	1.60	34.664	2961	27.758	45.3	1.38	33.5	22.55	262.67	2.66	1506.
3498	1.53	34.676	3443	27.772	44.8	1.26	31.7	24.76	335.99	3.12	1514.
3991	1.51	34.692	3924	27.787	44.7	1.19	30.0	26.95	419.41	3.34	1523.
4089	1.52	34.690	4020	27.784	45.3	1.19	30.2	27.39	437.65	3.38	1524.
4178	1.52	34.686	4107	27.781	45.8	1.18	30.5	27.79	454.79	3.38	1526.
4188	1.52	34.686*	4116	27.781	45.8	1.18	30.5	27.84	456.59		1526.



DATE 27/ 1/75

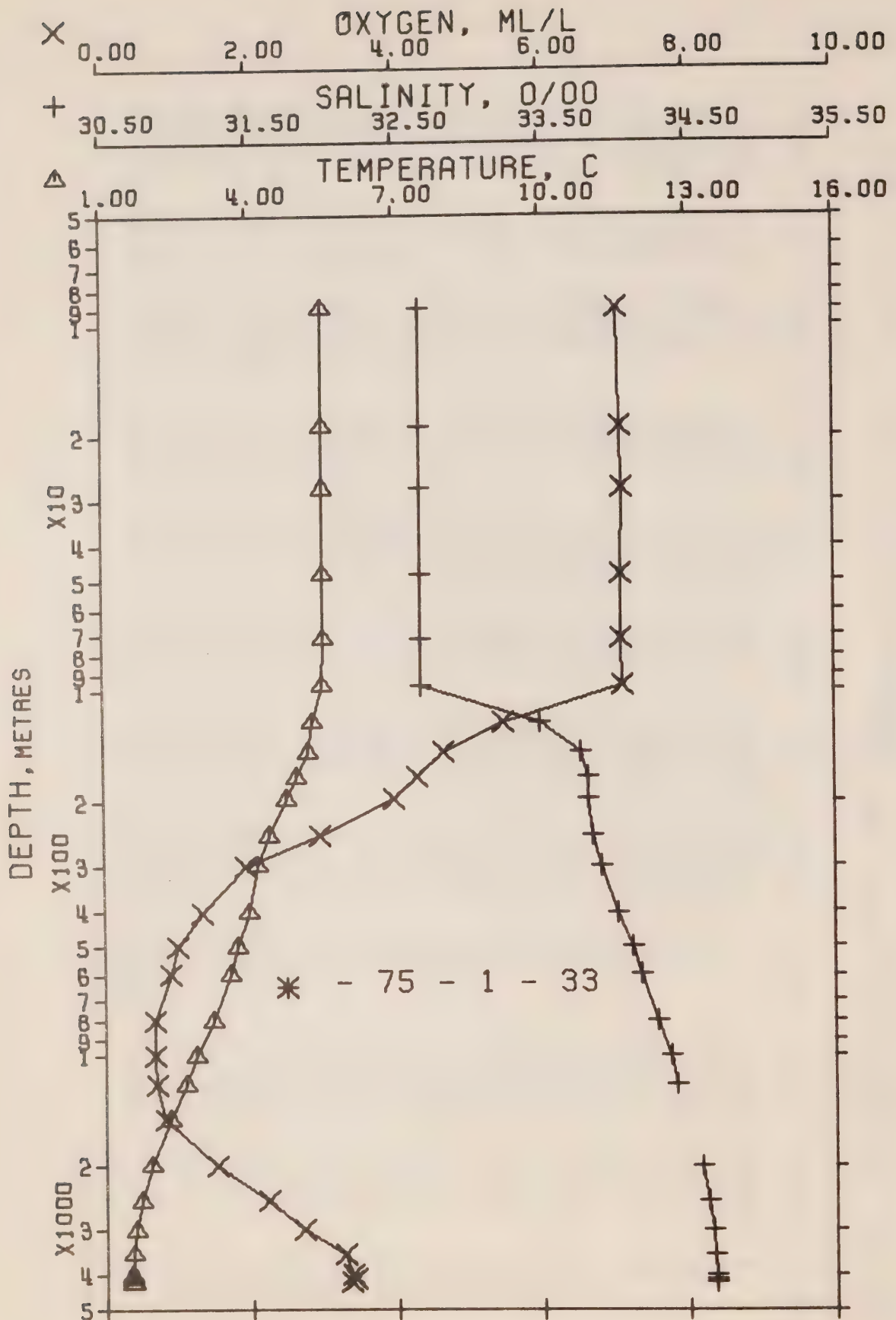
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OFFSHORE OCEANOGRAPHY GROUP

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HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.93	32.649	0	25.731	227.4	5.93	227.2	0.0	0.0	6.98	1472.
10	5.92	32.646	10	25.729	227.6	5.92	227.3	0.23	0.01	6.98	1472.
20	5.93	32.647	20	25.729	227.8	5.93	227.4	0.46	0.05	6.99	1472.
29	5.92	32.653	29	25.735	227.3	5.92	226.8	0.66	0.10	7.02	1472.
49	5.93	32.649	49	25.731	228.0	5.93	227.2	1.12	0.28	7.03	1472.
74	5.93	32.652	74	25.733	228.1	5.92	226.9	1.70	0.64	7.03	1473.
100	5.94	32.651	99	25.731	228.5	5.93	227.1	2.28	1.16	7.01	1473.
124	5.46	32.993	123	26.058	197.6	5.45	196.0	2.80	1.75	6.01	1472.
149	5.75	33.557	148	26.469	159.1	5.74	156.9	3.24	2.37	3.85	1475.
174	5.51	33.742	173	26.644	142.7	5.50	140.4	3.62	2.99		1474.
199	5.44	33.812	198	26.708	137.0	5.42	134.3	3.97	3.66	3.61	1474.
250	5.33	33.906	243	26.795	129.2	5.31	126.0	4.64	5.19	2.11	1475.
301	4.81	33.908	299	26.856	123.7	4.79	120.1	5.29	7.01	1.91	1474.
401	4.26	33.975	398	26.969	113.5	4.23	109.3	6.47	11.25		1473.
501	3.97	34.076	497	27.079	103.7	3.93	98.9	7.55	16.23	0.97	1474.
599	3.81	34.156	594	27.159	96.8	3.77	91.2	8.53	21.71	0.74	1475.
804	3.27	34.146	797	27.204	93.1	3.21	86.9	10.48	35.77	0.71	1476.
996	2.97	34.360	986	27.402	75.2	2.90	68.0	12.09	50.45	0.64	1478.
1191	2.70	34.399	1179	27.457	70.6	2.62	62.7	13.50	66.21	0.64	1480.
1488	2.38	34.488	1472	27.555	62.0	2.28	53.3	15.47	93.06	0.78	1484.
1992	1.98	34.580	1968	27.661	52.7	1.84	43.0	18.33	143.65	1.42	1491.
2504	1.77	34.624	2471	27.713	48.8	1.59	37.9	20.90	202.86	2.03	1498.
3015	1.61	34.654	2971	27.749	46.1	1.39	34.3	23.32	270.75	2.63	1506.
3519	1.55	34.675	3464	27.770	45.2	1.28	31.9	25.61	347.12	3.04	1515.
4010	1.52	34.635	3943	27.780	45.4	1.20	30.6	27.84	432.47	3.28	1523.
4105	1.52	34.689	4036	27.783	45.3	1.18	30.3	26.66	441.43	3.35	1525.
4190	1.52		4119								
4199	1.52		4128								



DATE 3/ 2/75

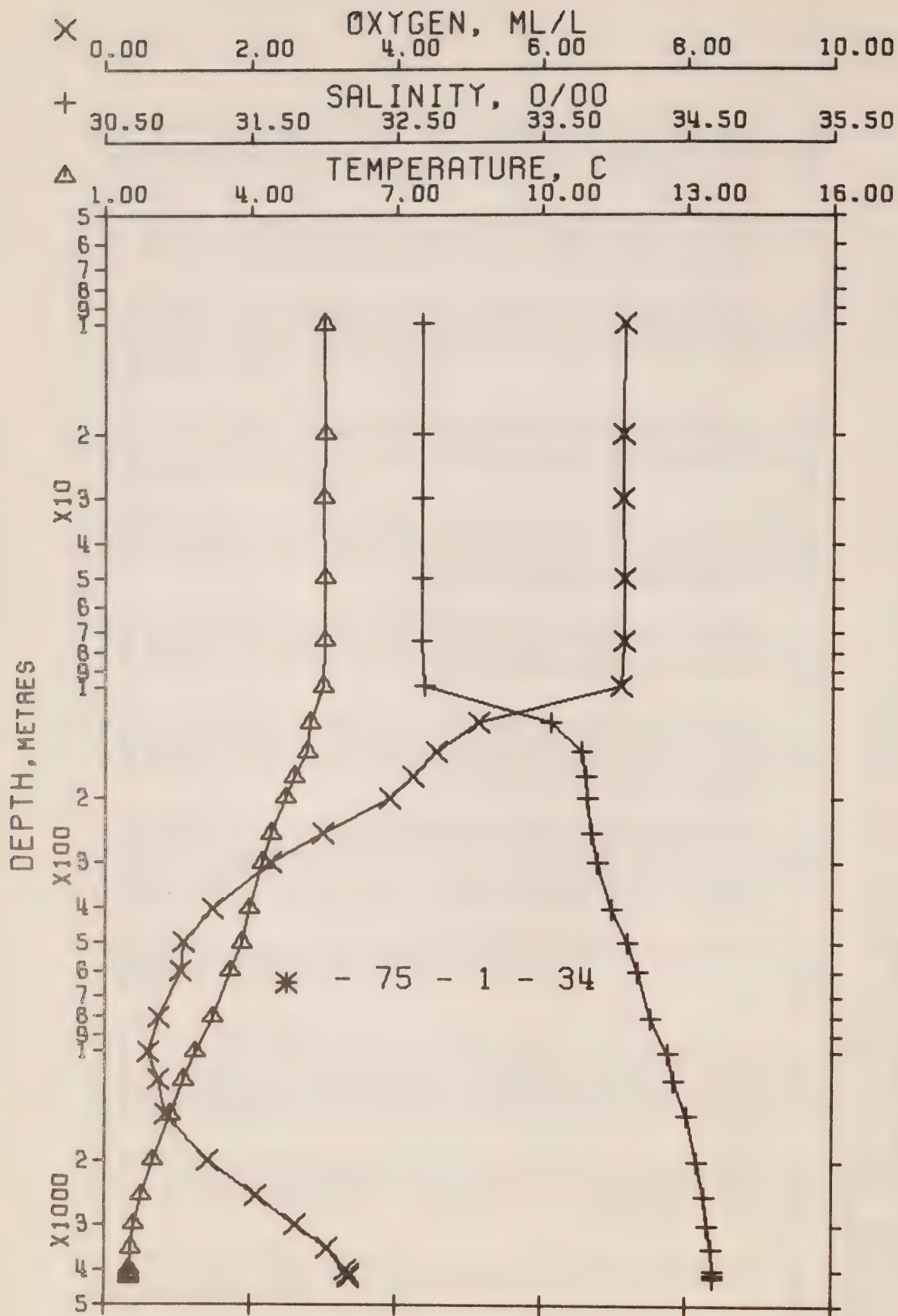
REFERENCE NO. 75- 1- 33

OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GMT 18.8

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.53	32.678	0	25.801	220.7	5.53	220.5	0.0	0.0	7.08	1470.
9	5.52	32.679	9	25.803	220.6	5.52	220.3	0.20	0.01	7.05	1470.
19	5.54	32.682	19	25.803	220.7	5.54	220.3	0.42	0.04	7.09	1470.
28	5.54	32.682	28	25.803	220.8	5.54	220.3	0.62	0.09	7.13	1471.
48	5.54	32.685	48	25.806	220.8	5.54	220.1	1.07	0.26	7.11	1471.
72	5.52	32.681	72	25.805	221.1	5.51	220.1	1.60	0.59	7.10	1471.
98	5.51	32.680	97	25.805	221.4	5.50	220.1	2.17	1.09	7.12	1472.
123	5.29	33.493	122	26.473	158.2	5.28	156.6	2.65	1.62	5.48	1472.
148	5.21	33.770	147	26.701	136.9	5.20	134.9	3.01	2.12	4.65	1473.
173	4.97	33.820	172	26.769	130.7	4.96	128.5	3.35	2.67	4.29	1472.
199	4.75	33.817	198	26.791	128.7	4.73	126.3	3.68	3.32	3.99	1472.
251	4.39	33.854	249	26.859	122.5	4.37	119.8	4.33	4.80	2.96	1471.
303	4.16	33.907	301	26.926	116.7	4.14	113.5	4.96	6.57	1.93	1471.
406	2.97	34.019	403	27.034	107.1	3.94	103.2	6.11	10.73	1.34	1472.
506	3.73	34.117	502	27.136	98.1	3.69	93.4	7.13	15.49	1.00	1473.
601	3.59	34.180	596	27.200	92.6	3.55	87.4	8.02	20.59	0.91	1474.
810	3.22	34.289	803	27.322	82.0	3.16	75.6	9.86	33.71	0.69	1476.
1012	2.86	34.382	1002	27.429	72.6	2.79	65.4	11.41	48.08	0.68	1478.
1213	2.64	34.420	1201	27.479	68.5	2.55	60.6	12.82	64.17	0.69	1480.
1518	2.31	34.499*	1501	27.562	61.3	2.21	52.7	14.80	91.63	0.83	1484.
2029	1.94	34.588	2004	27.671	51.8	1.80	42.1	17.66	143.26	1.52	1491.
2542	1.73	34.630	2508	27.721	47.9	1.55	37.2	20.20	202.47	2.22	1499.
3058	1.60	34.662	3013	27.756	45.5	1.37	33.5	22.59	270.83	2.69	1507.
3573	1.53	34.668	3517	27.766	45.6	1.25	32.3	24.93	349.94	3.25	1515.
4086	1.52	34.680	4017	27.776	45.9	1.19	30.9	27.27	441.21	3.35	1524.
4199	1.52	34.680	4117	27.776	46.2	1.18	30.8	27.74	461.15	3.40	1526.
4280	1.53	34.690*	4206	27.776	46.6	1.17	30.8	28.17	479.53		1529.
4290	1.52	34.680	4216	27.776	46.5	1.16	30.8	28.22	481.62	3.35	1528.



OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50-0.0 N, 145-0.0 W GMT 17.9
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75-1-34

DATE 9/ 2/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.51	32.679	0	25.804	220.5	5.51	220.2	0.0	0.0	7.09	1470.
10	5.51	32.682	10	25.807	220.3	5.51	220.0	0.22	0.01	7.13	1470.
20	5.52	32.677	20	25.802	220.9	5.52	220.4	0.44	0.05	7.13	1470.
30	5.51	32.682	30	25.807	220.5	5.51	220.0	0.67	0.10	7.12	1471.
50	5.52	32.682	50	25.806	220.8	5.52	220.1	1.11	0.28	7.14	1471.
74	5.52	32.679	74	25.803	221.3	5.51	220.2	1.64	0.62	7.14	1471.
100	5.50	32.703	99	25.824	219.6	5.49	218.2	2.21	1.13	7.10	1472.
126	5.24	33.574	125	26.543	151.6	5.23	150.0	2.70	1.68	5.15	1472.
151	5.16	33.782	150	26.717	135.4	5.15	133.5	3.05	2.18	4.57	1473.
176	4.91	33.812	175	26.769	130.6	4.90	128.5	3.38	2.74	4.23	1472.
201	4.73	33.819	200	26.795	128.4	4.71	126.0	3.71	3.37	3.92	1472.
253	4.43	33.854	251	26.855	123.0	4.41	120.3	4.36	4.86	3.01	1471.
304	4.24	33.891	302	26.905	118.7	4.22	115.6	4.98	6.63	2.28	1471.
406	3.96	33.992	403	27.014	109.1	3.93	105.1	6.14	10.83	1.48	1472.
506	3.81	34.096	502	27.112	100.5	3.77	95.8	7.18	15.70	1.07	1473.
604	3.58	34.172	599	27.195	93.2	3.54	87.8	8.13	21.05	1.05	1474.
813	3.22	34.265	806	27.302	83.9	3.16	77.4	9.98	34.42	0.74	1476.
1014	2.86	34.385	1004	27.432	72.3	2.79	65.2	11.53	48.89	0.60	1478.
1214	2.63	34.419	1202	27.479	68.5	2.55	60.6	12.94	64.88	0.73	1480.
1518	2.34	34.513	1501	27.579	59.8	2.24	51.1	14.88	91.91	0.83	1484.
2026	1.98	34.583	2001	27.664	52.7	1.84	42.8	17.70	142.93	1.41	1491.
2537	1.76	34.632	2503	27.720	48.2	1.58	37.2	20.27	202.50	2.08	1499.
3050	1.61	34.652	3005	27.747	46.3	1.38	34.4	22.68	271.26	2.61	1507.
3561	1.53	34.680	3505	27.776	44.7	1.25	31.4	25.00	349.40	3.06	1515.
4072	1.51	34.688	4003	27.783	45.1	1.18	30.3	27.28	438.27	3.33	1524.
4174	1.51	34.690	4103	27.785	45.3	1.17	30.1	27.75	457.77	3.37	1526.
4266	1.52	34.690	4192	27.784	45.7	1.17	30.0	28.16	475.67	3.37	1527.
4276	1.52	34.690*	4202	27.784	45.8	1.17	30.0	28.21	477.71		1528.

RESULTS OF STP OBSERVATIONS
(P-75-1)

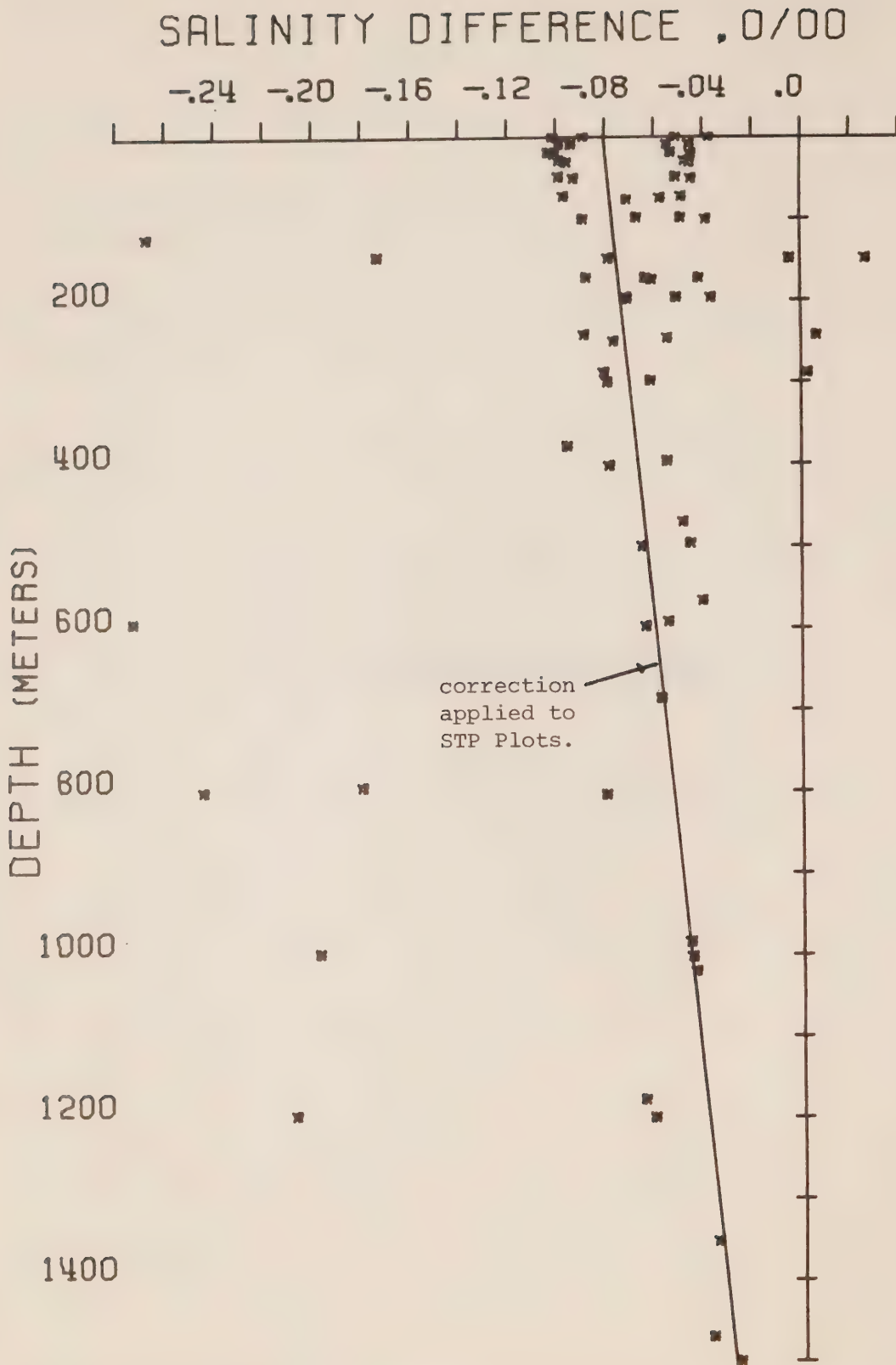


Figure 5. Salinity difference between hydro data and STP. P-75-1

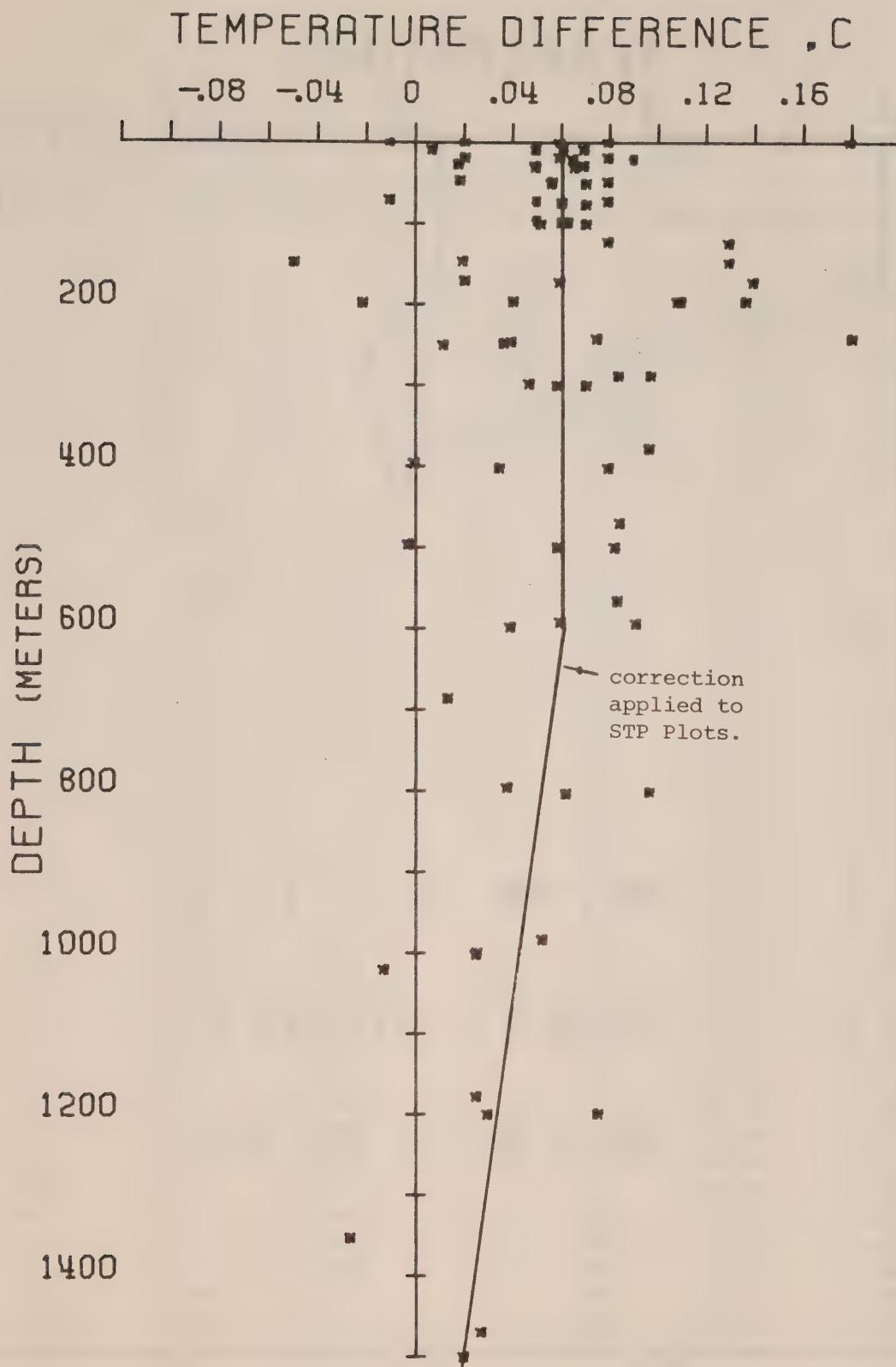
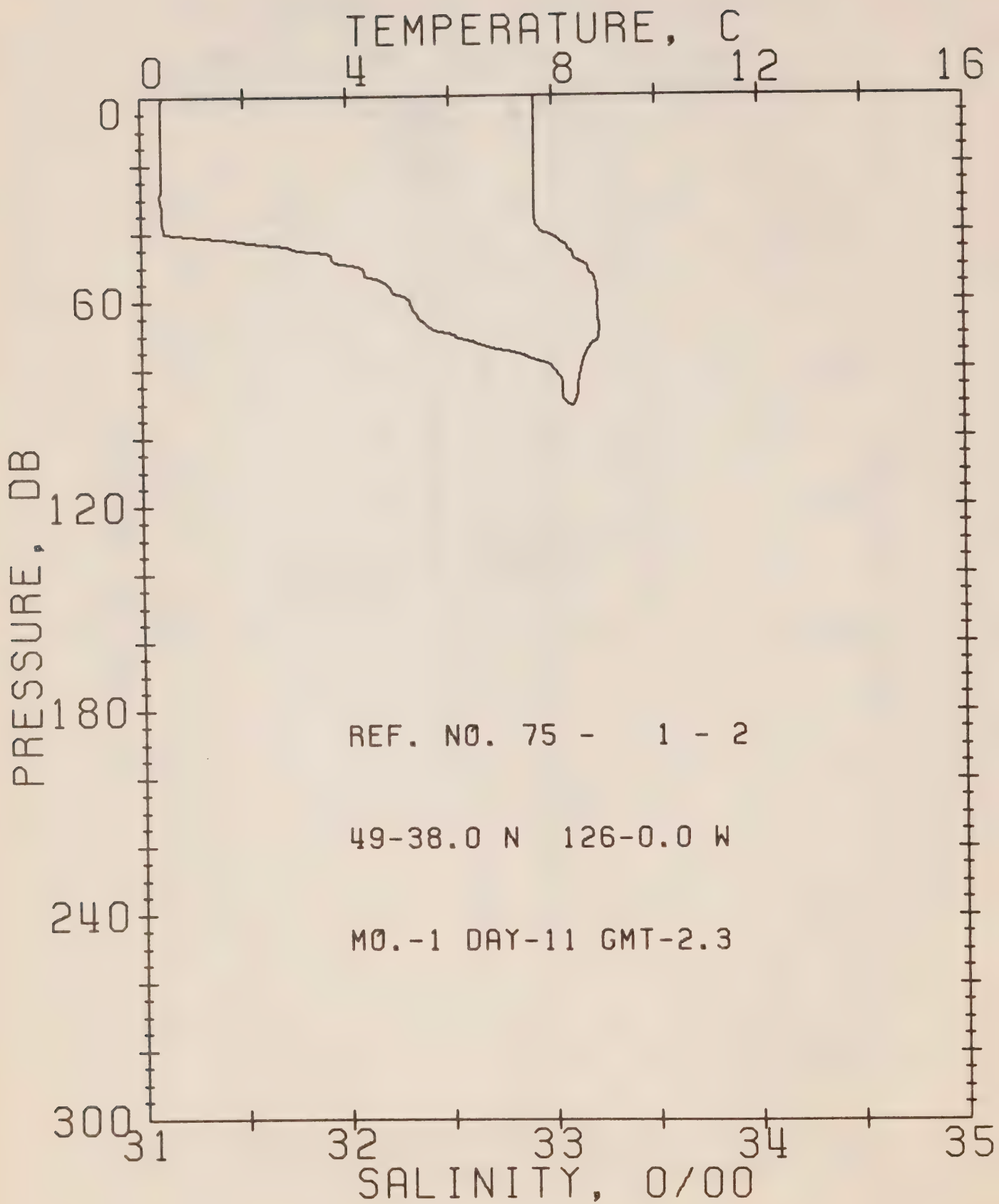


Figure 6. Temperature difference between hydro data and STP. P-75-1



OFFSHORE OCEANOGRAPHY GROUP

REFERENCE NO. 75- 1- 2

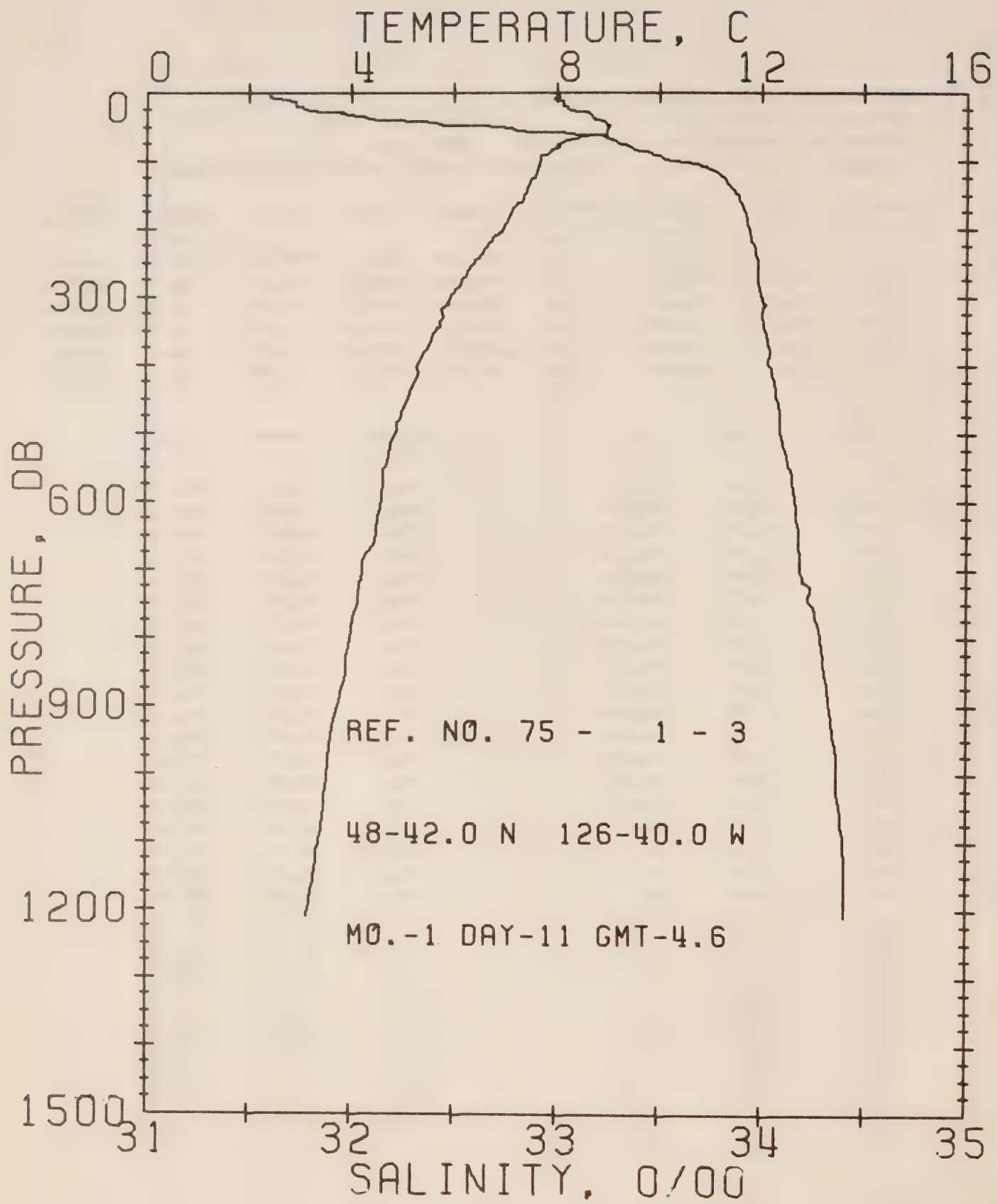
DATE 11/ 1/75

POSITION 49-38.0N, 126- 0.0W GMT 2.3

RESULTS OF STP CAST 59 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.66	31.11	0	24.30	363.7	0.0	0.0	1477.
10	7.65	31.10	10	24.29	364.6	0.36	0.02	1477.
20	7.65	31.10	20	24.29	364.7	0.73	0.07	1477.
30	7.65	31.09	30	24.28	365.5	1.09	0.17	1477.
50	8.68	32.06	50	24.89	308.0	1.79	0.45	1483.
75	8.65	32.81	75	25.48	252.2	2.51	0.91	1484.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	7.66	31.11	53.	8.81	32.09
2.	7.65	31.10	54.	8.84	32.16
4.	7.65	31.10	55.	8.85	32.19
8.	7.65	31.10	56.	8.86	32.21
12.	7.65	31.10	58.	8.87	32.23
13.	7.65	31.10	59.	8.87	32.28
17.	7.65	31.10	60.	8.88	32.31
19.	7.65	31.10	61.	8.86	32.31
21.	7.65	31.10	63.	8.88	32.32
24.	7.65	31.10	64.	8.89	32.34
28.	7.65	31.10	65.	8.88	32.35
29.	7.65	31.09	67.	8.90	32.38
33.	7.66	31.10	69.	8.90	32.42
36.	7.66	31.10	70.	8.89	32.52
37.	7.68	31.10	71.	8.89	32.53
38.	7.69	31.10	72.	8.86	32.61
39.	7.73	31.11	73.	8.76	32.64
40.	7.78	31.11	74.	8.68	32.70
41.	7.97	31.23	75.	8.65	32.81
42.	8.11	31.45	76.	8.60	32.86
43.	8.16	31.53	77.	8.59	32.88
44.	8.29	31.71	79.	8.56	32.99
45.	8.30	31.76	80.	8.54	33.00
46.	8.39	31.91	83.	8.50	33.04
47.	8.40	31.93	84.	8.47	33.05
48.	8.42	31.93	87.	8.47	33.05
49.	8.57	31.94	89.	8.45	33.05
50.	8.68	32.06	90.	8.41	33.07
51.	8.70	32.08	91.	8.38	33.09
52.	8.72	32.09			



OFFSHORE OCEANOGRAPHY GROUP

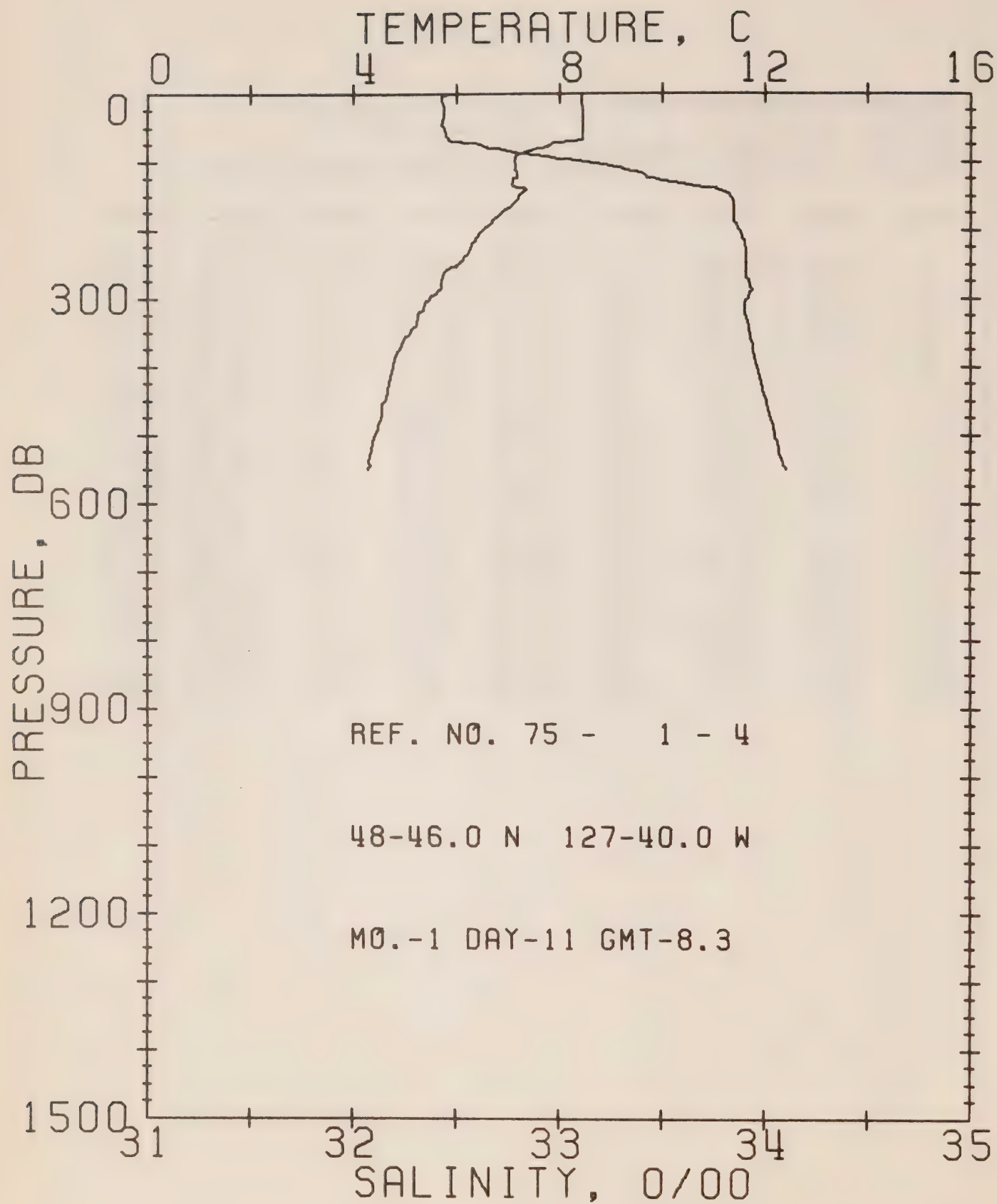
REFERENCE NO. 75- 1- 3

DATE 11/ 1/75

POSITION 48-42.0N, 126-40.0W GMT 4.6

RESULTS OF STP CAST 227 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.03	31.60	0	24.63	332.1	0.0	0.0	1479.
10	7.94	31.68	10	24.70	325.3	0.33	0.02	1479.
20	8.22	31.76	20	24.73	323.3	0.65	0.07	1480.
30	8.65	31.96	30	24.82	314.6	0.97	0.15	1482.
50	9.02	32.71	50	25.35	264.7	1.57	0.39	1485.
75	8.06	33.31	75	25.96	206.5	2.14	0.75	1482.
100	7.67	33.60	99	26.25	180.0	2.63	1.18	1481.
125	7.56	33.82	124	26.44	162.5	3.05	1.67	1482.
150	7.38	33.89	149	26.51	155.4	3.45	2.22	1482.
175	7.12	33.92	174	26.57	150.0	3.83	2.86	1481.
200	6.95	33.94	199	26.61	146.4	4.20	3.56	1481.
225	6.66	33.96	223	26.67	141.1	4.55	4.34	1480.
250	6.38	33.98	248	26.72	136.7	4.91	5.18	1479.
300	5.94	34.00	298	26.79	130.3	5.58	7.06	1478.
400	5.29	34.03	397	26.90	120.8	6.83	11.54	1477.
500	4.87	34.09	496	27.00	112.6	8.00	16.86	1477.
600	4.60	34.17	595	27.08	105.0	9.08	22.92	1478.
800	4.00	34.29	793	27.25	90.6	11.05	36.97	1479.
1000	3.55	34.37	991	27.36	81.0	12.77	52.63	1480.
1200	3.17	34.41	1188	27.42	75.1	14.32	70.08	1482.



OFFSHORE OCEANOGRAPHY GROUP

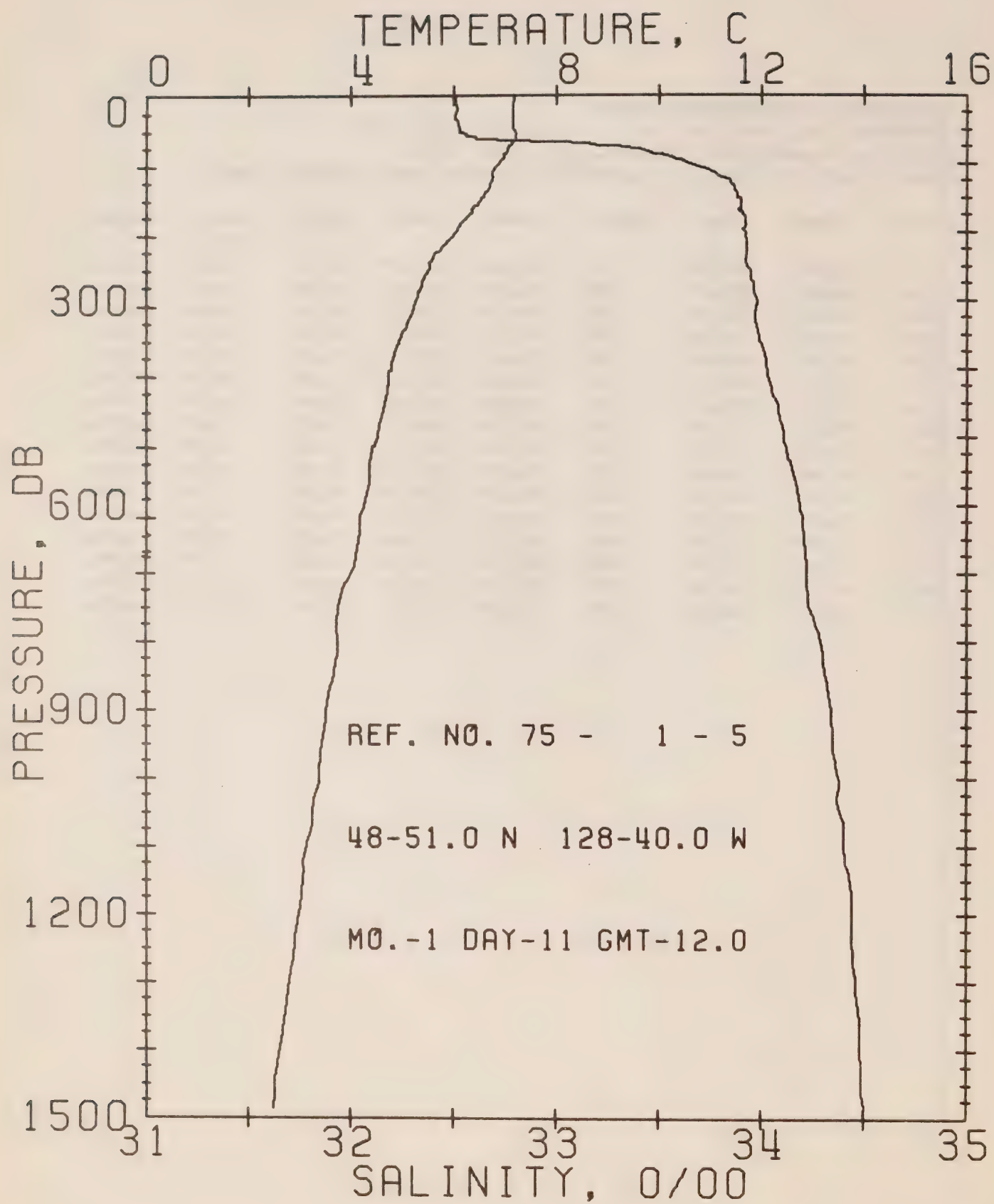
REFERENCE NO. 75- 1- 4

DATE 11/ 1/75

POSITION 48-46.0N, 127-40.0W GMT 8.3

RESULTS OF STP CAST 154 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.44	32.46	0	25.24	273.7	0.0	0.0	1481.
10	8.44	32.43	10	25.22	276.4	0.28	0.01	1481.
20	8.46	32.44	20	25.22	276.1	0.55	0.06	1482.
30	8.46	32.44	30	25.22	276.2	0.83	0.13	1482.
50	8.46	32.44	50	25.22	276.5	1.38	0.35	1482.
75	7.82	32.63	75	25.46	253.8	2.06	0.78	1480.
100	7.12	33.13	99	25.96	207.5	2.64	1.30	1479.
125	7.10	33.47	124	26.23	182.2	3.12	1.85	1479.
150	7.21	33.83	149	26.49	157.2	3.54	2.44	1481.
175	6.86	33.85	174	26.56	151.5	3.93	3.08	1480.
200	6.50	33.88	199	26.63	145.3	4.30	3.79	1479.
225	6.28	33.90	223	26.68	140.7	4.66	4.56	1478.
250	6.03	33.91	248	26.71	137.4	5.00	5.40	1478.
300	5.47	33.92	298	26.79	130.4	5.67	7.27	1476.
400	4.78	33.96	397	26.90	120.4	6.93	11.75	1475.
500	4.41	34.05	496	27.01	110.5	8.09	17.05	1475.



OFFSHORE OCEANOGRAPHY GROUP

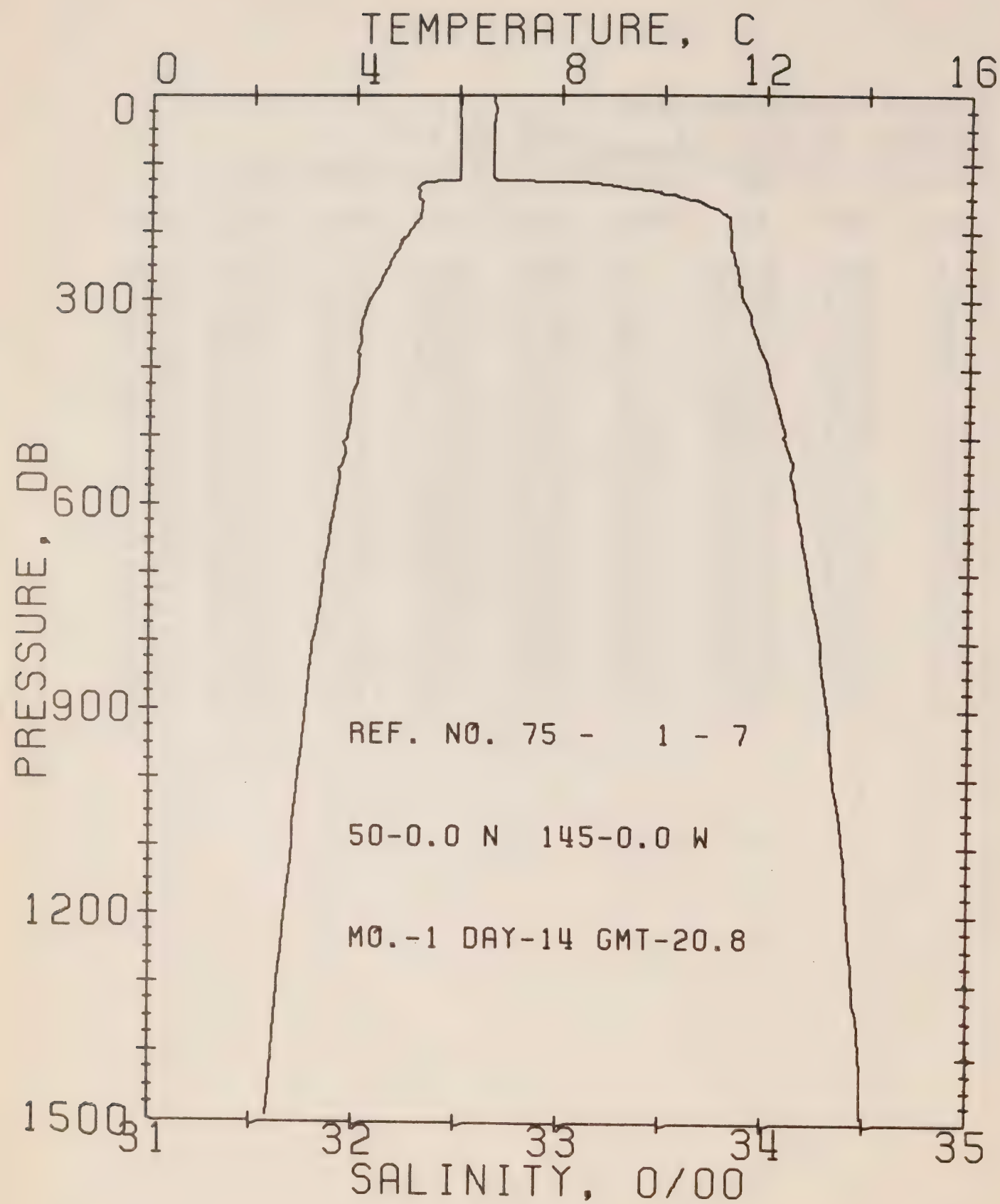
REFERENCE NO. 75- 1- 5

DATE 11/ 1/75

POSITION 48-51.0N, 128-40.0W GMT 12.0

RESULTS OF STP CAST 259 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.16	32.51	0	25.46	252.7	0.0	0.0	1476.
10	7.15	32.51	10	25.46	253.0	0.25	0.01	1477.
20	7.15	32.52	20	25.47	252.4	0.51	0.05	1477.
30	7.15	32.51	30	25.46	253.1	0.76	0.12	1477.
50	7.17	32.53	50	25.48	252.2	1.26	0.32	1477.
75	7.07	33.32	75	26.11	192.3	1.85	0.69	1478.
100	6.86	33.56	99	26.41	164.6	2.29	1.08	1478.
125	6.74	33.85	124	26.57	149.3	2.68	1.53	1479.
150	6.55	33.89	149	26.63	144.1	3.05	2.04	1478.
175	6.29	33.92	174	26.69	139.0	3.40	2.63	1478.
200	6.04	33.92	199	26.72	135.8	3.75	3.29	1477.
225	5.75	33.93	223	26.76	132.2	4.08	4.02	1476.
250	5.55	33.93	248	26.79	130.1	4.41	4.81	1476.
300	5.26	33.98	298	26.86	123.5	5.04	6.58	1476.
400	4.80	34.03	397	26.95	115.7	6.24	10.86	1475.
500	4.53	34.11	496	27.05	107.3	7.36	15.96	1476.
600	4.26	34.19	595	27.14	99.3	8.39	21.74	1477.
800	3.77	34.29	793	27.27	88.1	10.27	35.14	1478.
1000	3.38	34.38	990	27.38	78.6	11.93	50.35	1480.
1200	2.99	34.44	1188	27.46	70.8	13.42	67.05	1481.



OFFSHORE OCEANOGRAPHY GROUP

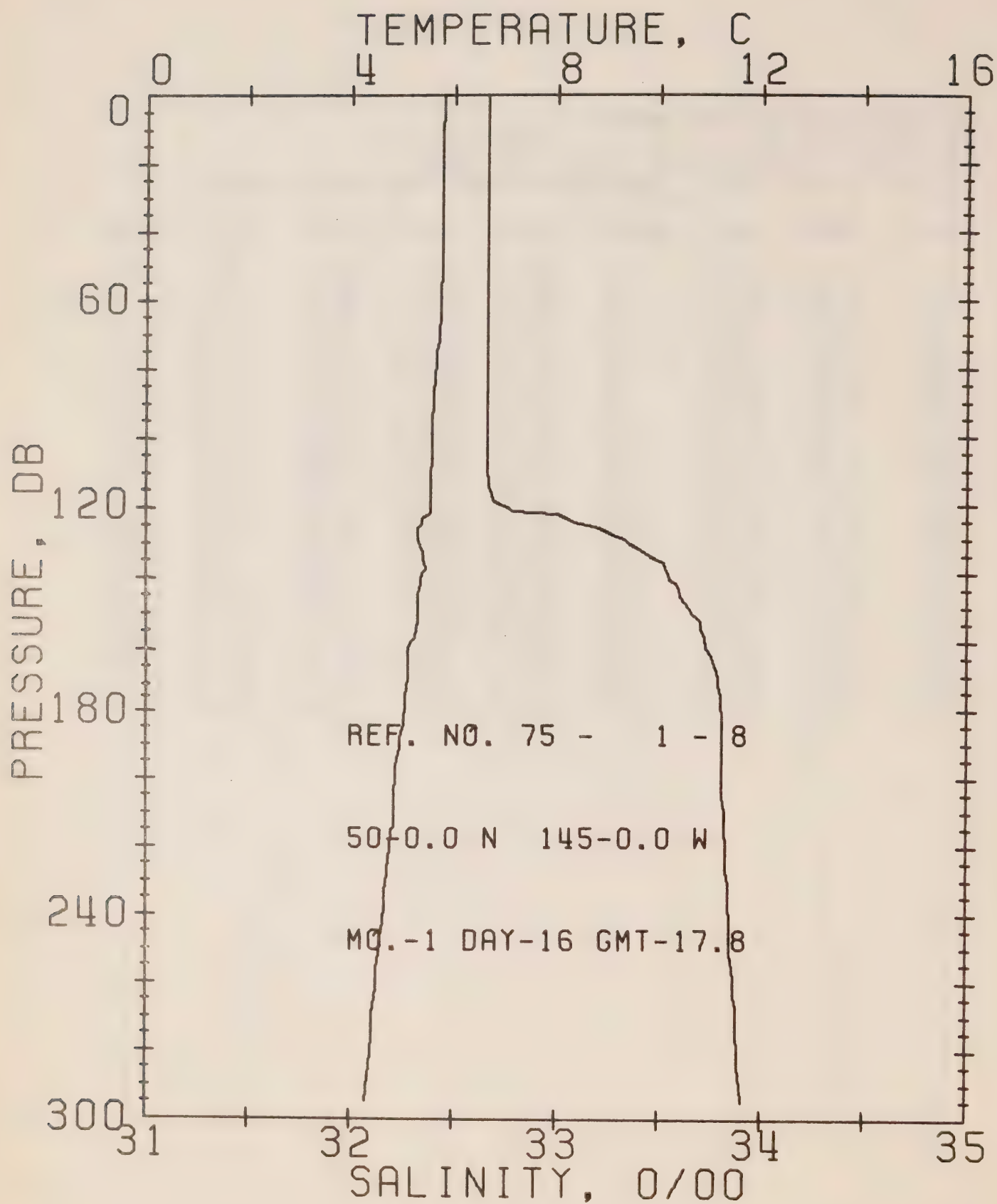
REFERENCE NO. 75- 1- 7

DATE 14/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 20.8

RESULTS OF STP CAST 194 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.93	32.67	0	25.75	225.7	0.0	0.0	1472.
10	6.02	32.67	10	25.74	226.9	0.23	0.01	1472.
20	6.01	32.68	20	25.75	226.3	0.45	0.05	1472.
30	6.01	32.68	30	25.74	226.7	0.68	0.10	1473.
50	6.02	32.67	50	25.74	227.5	1.13	0.29	1473.
75	6.02	32.67	75	25.74	227.7	1.70	0.65	1473.
100	6.03	32.67	99	25.73	228.1	2.27	1.16	1474.
125	6.00	32.68	124	25.75	227.3	2.84	1.81	1474.
150	5.23	33.59	149	26.56	150.6	3.27	2.41	1473.
175	5.25	33.80	174	26.72	135.4	3.63	3.00	1473.
200	5.04	33.83	199	26.77	131.0	3.96	3.63	1473.
225	4.84	33.83	223	26.79	129.0	4.28	4.34	1472.
250	4.65	33.85	248	26.83	125.4	4.60	5.11	1472.
300	4.37	33.89	298	26.89	120.1	5.21	6.82	1472.
400	4.08	34.01	397	27.02	108.8	6.35	10.87	1472.
500	3.87	34.09	496	27.10	101.3	7.40	15.66	1473.
600	3.64	34.16	595	27.18	94.6	8.37	21.12	1474.
800	3.22	34.28	793	27.31	82.8	10.15	33.77	1476.
1000	2.93	34.34	990	27.39	76.0	11.74	48.31	1478.
1200	2.68	34.42	1188	27.47	69.1	13.18	64.44	1480.



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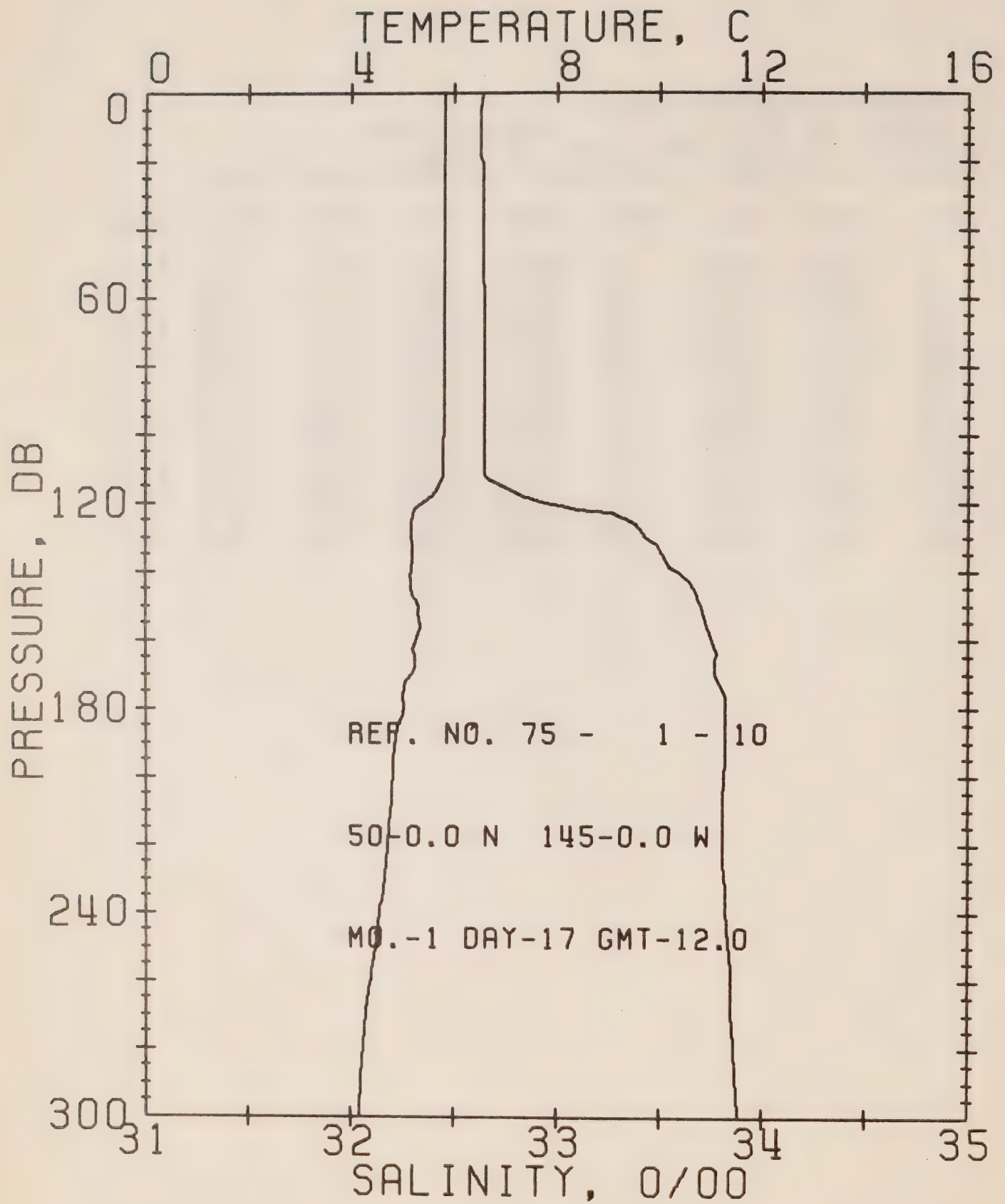
REFERENCE NO. 75- 1- 8

DATE 16/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 106 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.78	32.66	0	25.76	224.7	0.0	0.0	1471.
10	5.77	32.66	10	25.76	224.9	0.22	0.01	1471.
20	5.77	32.66	20	25.76	225.0	0.45	0.05	1471.
30	5.77	32.66	30	25.76	225.0	0.67	0.10	1472.
50	5.75	32.66	50	25.76	225.2	1.13	0.29	1472.
75	5.66	32.66	75	25.77	224.3	1.69	0.65	1472.
100	5.57	32.66	99	25.78	223.6	2.25	1.14	1472.
125	5.38	33.08	124	26.14	190.2	2.80	1.77	1472.
150	5.32	33.64	149	26.59	147.8	3.20	2.34	1473.
175	5.08	33.80	174	26.74	133.7	3.55	2.91	1473.
200	4.88	33.81	199	26.77	130.7	3.88	3.54	1472.
225	4.73	33.83	223	26.80	127.9	4.20	4.24	1472.
250	4.58	33.85	248	26.84	124.9	4.52	5.01	1472.



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REFERENCE NO. 75- 1- 10

DATE 17/ 1/75

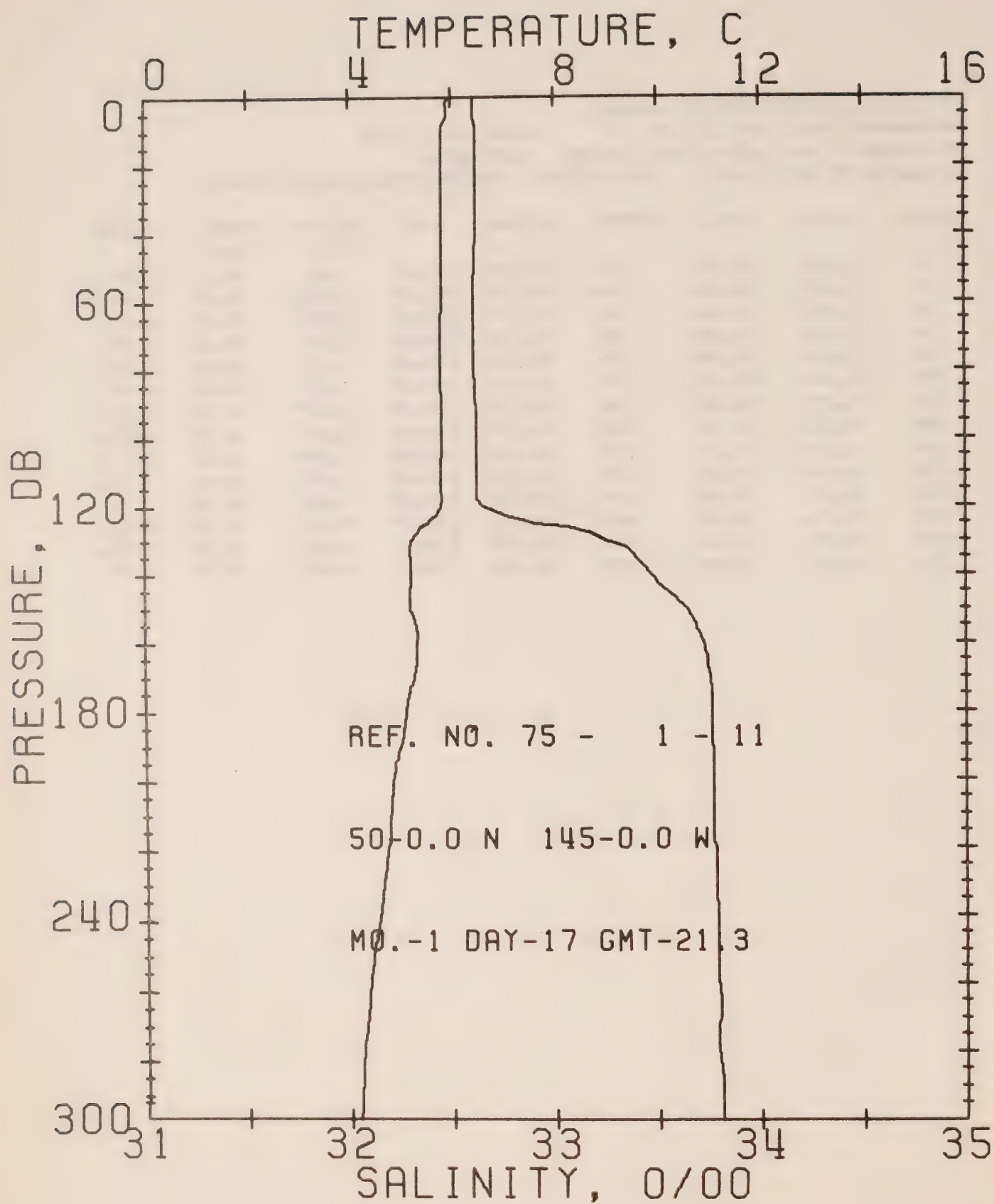
POSITION 50- 0.0N, 145- 0.0W

GMT 12.0

RESULTS OF STP CAST

65 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.82	32.64	0	25.74	226.7	0.0	0.0	1471.
10	5.82	32.63	10	25.73	227.7	0.23	0.01	1471.
20	5.82	32.63	20	25.73	227.5	0.46	0.05	1472.
30	5.80	32.64	30	25.74	226.9	0.68	0.10	1472.
50	5.80	32.64	50	25.74	227.2	1.14	0.29	1472.
75	5.81	32.65	75	25.75	226.8	1.70	0.65	1472.
100	5.80	32.65	99	25.75	226.9	2.27	1.16	1473.
125	5.19	33.34	124	26.36	168.6	2.81	1.77	1472.
150	5.34	33.70	149	26.63	143.6	3.19	2.31	1473.
175	5.03	33.80	174	26.75	132.6	3.54	2.88	1472.
200	4.82	33.82	199	26.78	129.6	3.86	3.50	1472.
225	4.69	33.81	223	26.79	128.9	4.19	4.20	1472.
250	4.49	33.84	248	26.83	124.9	4.50	4.97	1471.
300	4.15	33.88	298	26.91	118.5	5.11	6.67	1471.



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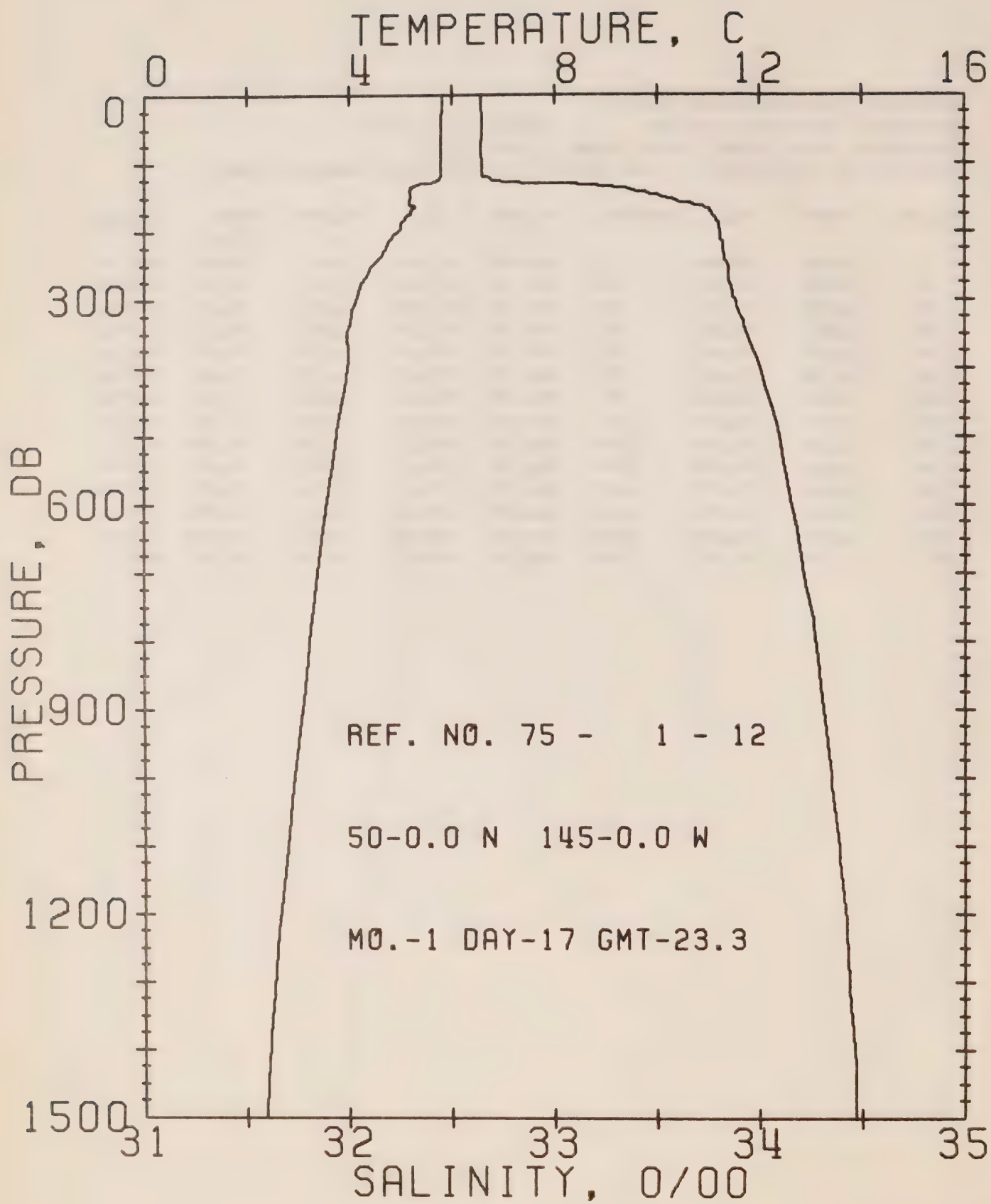
REFERENCE NO. 75- 1- 11

DATE 17/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 21.3

RESULTS OF STP CAST 99 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.91	32.61	0	25.70	229.9	0.0	0.0	1472.
10	5.82	32.62	10	25.72	228.5	0.23	0.01	1471.
20	5.82	32.62	20	25.72	228.5	0.46	0.05	1472.
30	5.81	32.62	30	25.72	228.6	0.69	0.10	1472.
50	5.80	32.61	50	25.72	229.1	1.14	0.29	1472.
75	5.79	32.61	75	25.72	229.6	1.72	0.66	1472.
100	5.80	32.62	99	25.72	229.1	2.29	1.17	1473.
125	5.53	32.90	124	25.98	205.4	2.86	1.82	1472.
150	5.18	33.64	149	26.60	146.3	3.27	2.39	1472.
175	5.16	33.76	174	26.70	137.3	3.62	2.98	1473.
200	4.84	33.77	199	26.74	133.3	3.96	3.63	1472.
225	4.68	33.78	223	26.77	131.0	4.29	4.34	1472.
250	4.45	33.79	248	26.80	128.0	4.62	5.13	1471.
300	4.15	33.81	298	26.85	123.7	5.25	6.89	1471.



OFFSHORE OCEANOGRAPHY GROUP

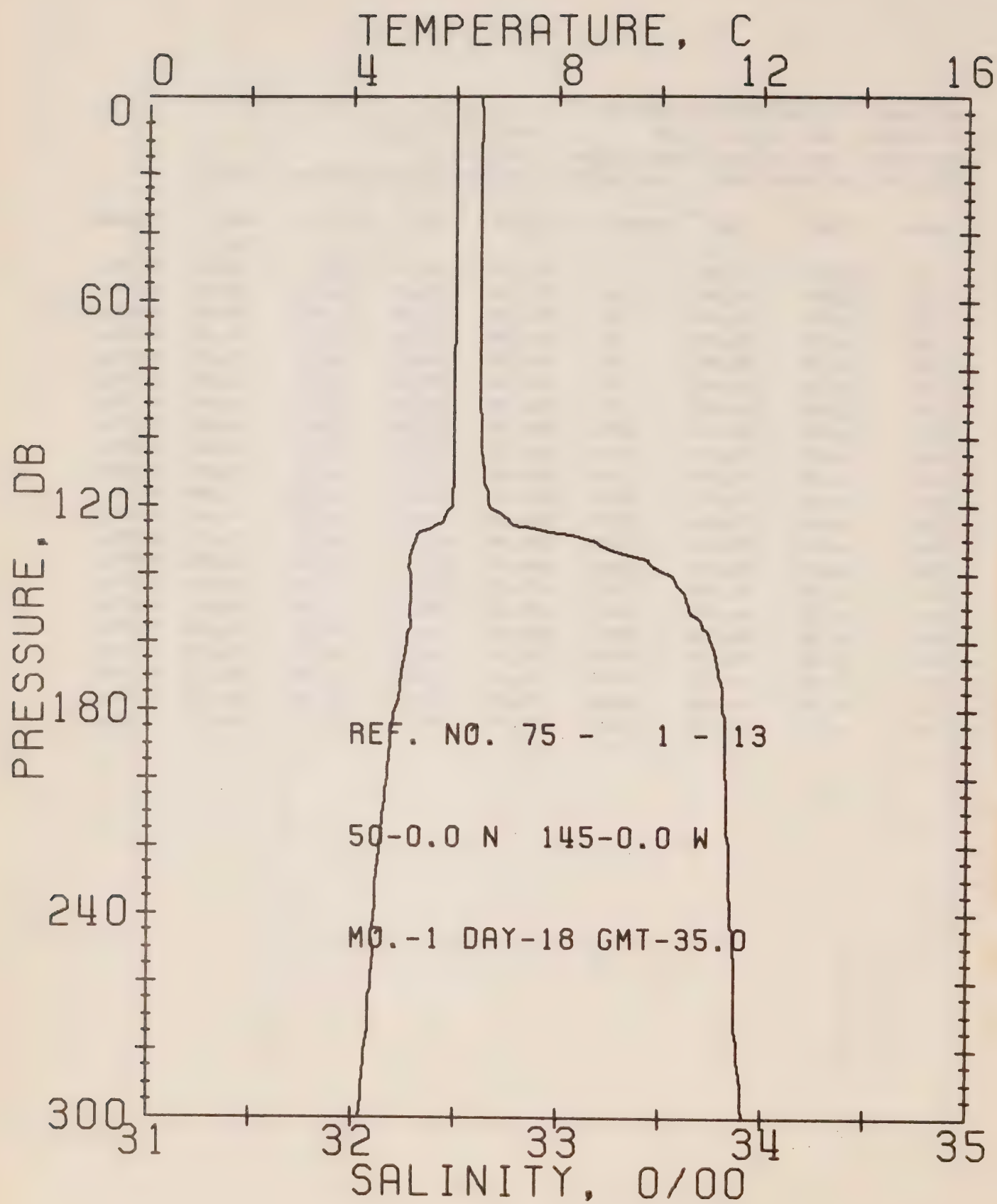
REFERENCE NO. 75- 1- 12

DATE 17/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 23.3

RESULTS OF STP CAST 117 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.80	32.64	0	25.74	226.4	0.0	0.0	1471.
10	5.80	32.64	10	25.74	226.6	0.23	0.01	1471.
20	5.80	32.64	20	25.74	226.6	0.45	0.05	1471.
30	5.79	32.65	30	25.74	226.4	0.68	0.10	1472.
50	5.79	32.65	50	25.75	226.2	1.13	0.29	1472.
75	5.78	32.64	75	25.74	227.1	1.70	0.65	1472.
100	5.78	32.65	99	25.75	226.9	2.27	1.16	1473.
125	5.74	32.70	124	25.79	222.8	2.83	1.80	1473.
150	5.20	33.54	149	26.52	153.7	3.27	2.42	1472.
175	5.20	33.77	174	26.70	137.1	3.63	3.01	1473.
200	4.94	33.81	199	26.76	131.4	3.96	3.65	1472.
225	4.73	33.82	223	26.80	128.5	4.29	4.35	1472.
250	4.46	33.84	248	26.84	124.0	4.60	5.11	1471.
300	4.13	33.88	298	26.91	118.3	5.21	6.81	1471.
400	3.98	34.00	397	27.02	108.6	6.34	10.84	1472.
500	3.75	34.09	496	27.12	100.0	7.38	15.61	1473.
600	3.56	34.16	595	27.18	94.2	8.35	21.05	1474.
800	3.23	34.27	793	27.31	83.5	10.13	33.64	1476.
1000	2.93	34.35	990	27.40	75.6	11.72	48.22	1478.
1200	2.65	34.42	1188	27.48	68.7	13.16	64.37	1480.
1500	2.37	34.47	1484	27.54	63.3	15.13	91.38	1484.



OFFSHORE OCEANOGRAPHY GROUP

REFERENCE NO. 75- 1- 13

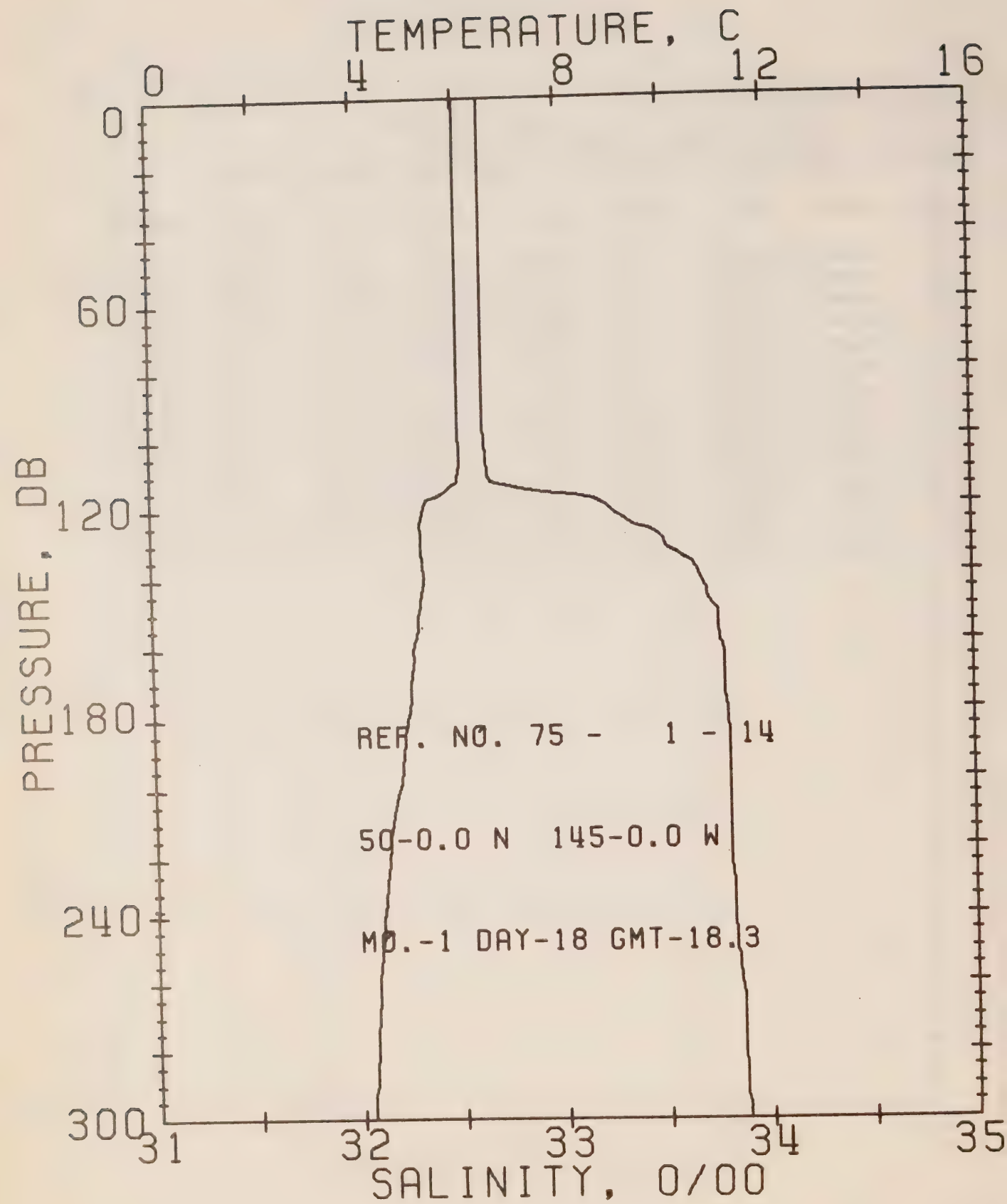
DATE 18/ 1/75

POSITION 50- 0.0N, 145- 0.0W

GMT 35.0

RESULTS OF STP CAST 113 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.99	32.62	0	25.70	230.1	0.0	0.0	1472.
10	5.99	32.63	10	25.71	229.6	0.23	0.01	1472.
20	5.99	32.62	20	25.70	230.6	0.46	0.05	1472.
30	5.99	32.62	30	25.70	230.7	0.69	0.11	1472.
50	5.99	32.62	50	25.70	230.9	1.15	0.29	1473.
75	5.98	32.62	75	25.70	231.1	1.73	0.66	1473.
100	5.97	32.63	99	25.71	230.5	2.31	1.18	1473.
125	5.75	32.77	124	25.85	217.6	2.88	1.83	1473.
150	5.12	33.64	149	26.61	145.6	3.30	2.41	1472.
175	4.92	33.81	174	26.77	130.9	3.64	2.98	1472.
200	4.68	33.82	199	26.80	127.5	3.96	3.59	1471.
225	4.51	33.84	223	26.84	124.7	4.27	4.28	1471.
250	4.41	33.86	248	26.86	122.4	4.58	5.02	1471.
300	4.14	33.91	298	26.93	116.2	5.18	6.70	1471.



OFFSHORE OCEANOGRAPHY GROUP

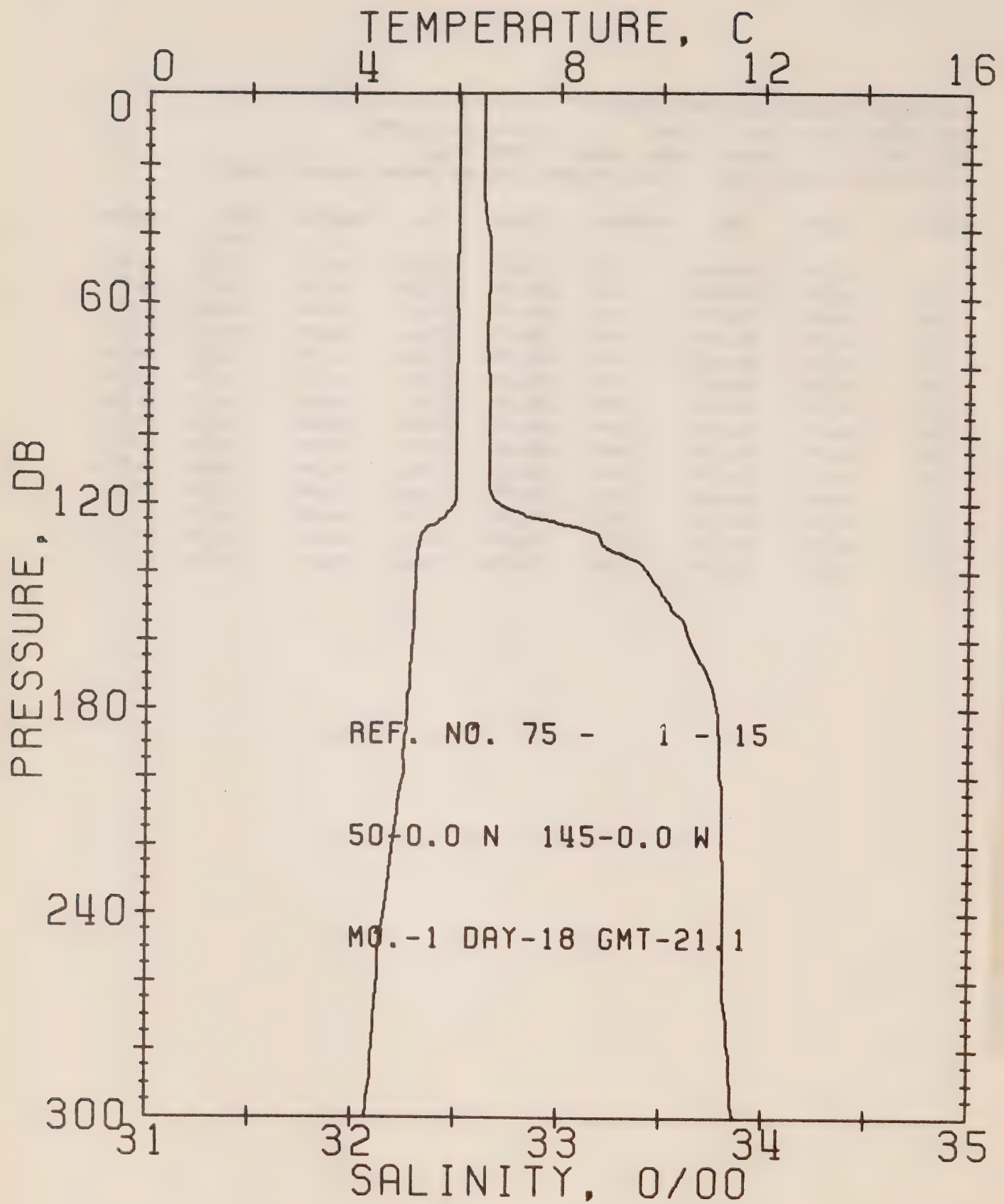
REFERENCE NO. 75- 1- 14

DATE 18/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 18.3

RESULTS OF STP CAST 104 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.02	32.63	0	25.70	229.7	0.0	0.0	1472.
10	6.02	32.63	10	25.70	230.0	0.23	0.01	1472.
20	6.02	32.63	20	25.70	230.1	0.46	0.05	1472.
30	6.02	32.63	30	25.70	230.3	0.69	0.11	1473.
50	6.03	32.63	50	25.70	230.6	1.15	0.29	1473.
75	6.03	32.63	75	25.70	230.9	1.73	0.66	1473.
100	6.03	32.63	99	25.71	230.9	2.31	1.18	1474.
125	5.24	33.34	124	26.36	169.1	2.83	1.78	1472.
150	5.23	33.74	149	26.68	139.1	3.21	2.30	1473.
175	5.03	33.79	174	26.74	133.7	3.55	2.86	1472.
200	4.83	33.81	199	26.78	130.1	3.88	3.49	1472.
225	4.54	33.81	223	26.81	127.2	4.20	4.19	1471.
250	4.38	33.83	248	26.84	124.2	4.51	4.95	1471.
300	4.21	33.88	298	26.90	119.2	5.12	6.64	1471.



OFFSHORE OCEANOGRAPHY GROUP

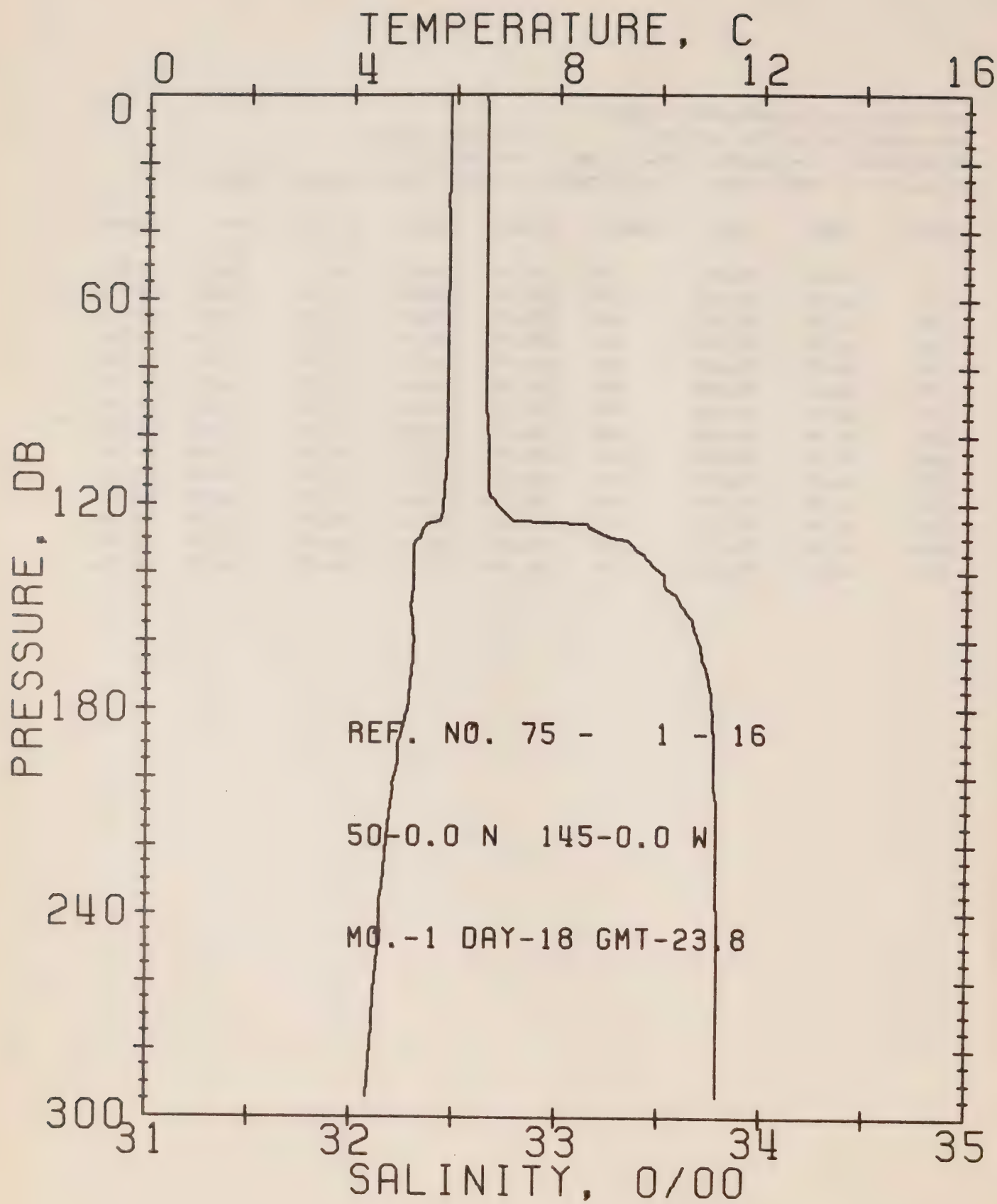
REFERENCE NO. 75- 1- 15

DATE 18/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 21.1

RESULTS OF STP CAST 91 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.02	32.63	0	25.70	229.7	0.0	0.0	1472.
10	6.03	32.63	10	25.70	230.1	0.23	0.01	1472.
20	6.03	32.63	20	25.70	230.3	0.46	0.05	1472.
30	6.03	32.63	30	25.70	230.4	0.69	0.11	1473.
50	6.01	32.66	50	25.73	228.1	1.15	0.29	1473.
75	6.02	32.65	75	25.72	229.1	1.72	0.66	1473.
100	6.01	32.66	99	25.73	228.6	2.29	1.17	1474.
125	5.66	32.97	124	26.02	201.6	2.86	1.81	1473.
150	5.21	33.55	149	26.53	153.3	3.28	2.41	1472.
175	5.09	33.75	174	26.70	137.0	3.64	3.00	1473.
200	4.98	33.79	199	26.74	133.4	3.98	3.65	1473.
225	4.75	33.81	223	26.78	129.8	4.31	4.36	1472.
250	4.52	33.81	248	26.81	127.3	4.63	5.13	1472.
300	4.26	33.86	298	26.88	121.2	5.25	6.88	1471.



OFFSHORE OCEANOGRAPHY GROUP

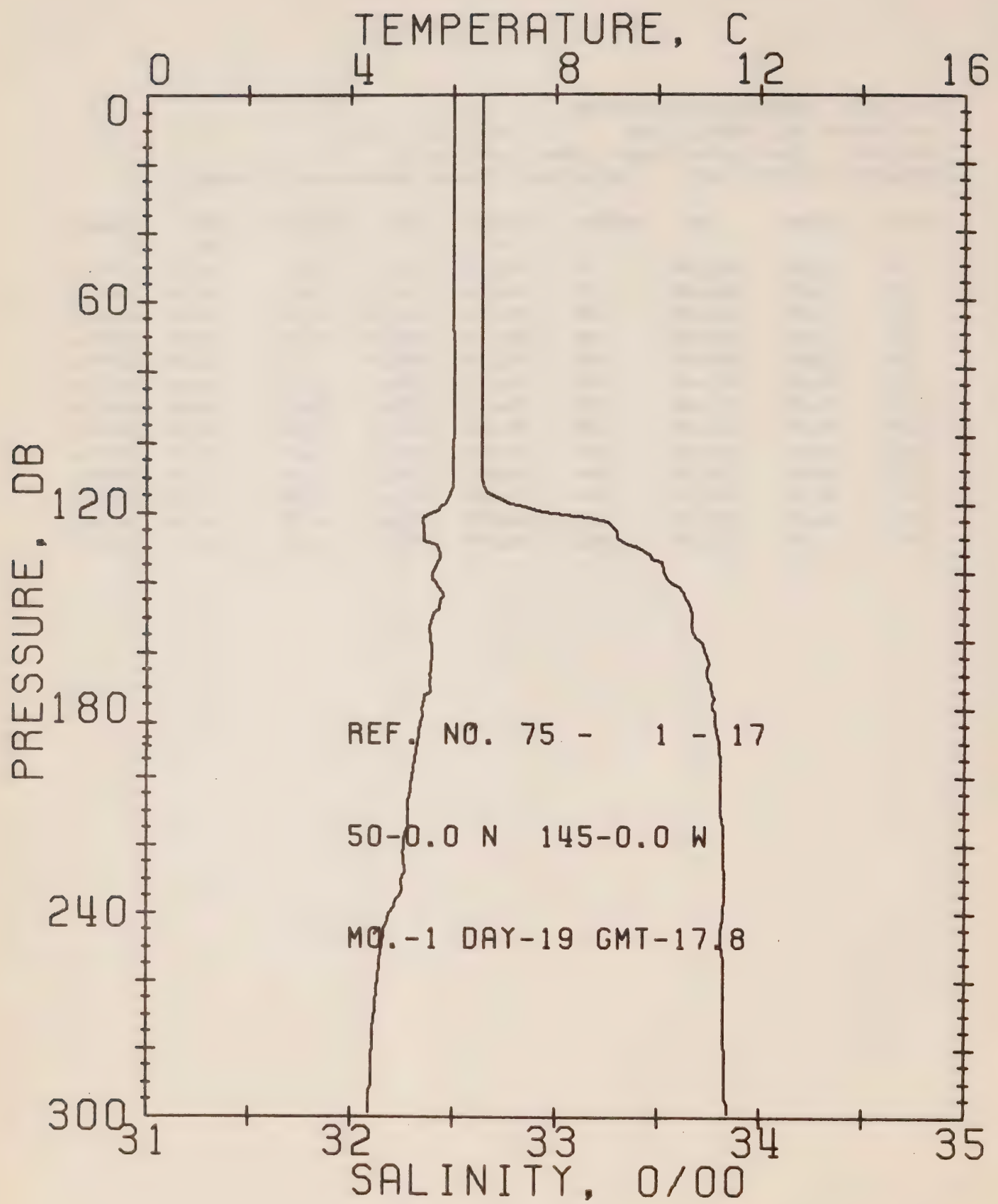
REFERENCE NO. 75- 1- 16

DATE 18/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 23.8

RESULTS OF STP CAST 97 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.86	32.64	0	25.73	227.1	0.0	0.0	1471.
10	5.87	32.65	10	25.74	226.8	0.23	0.01	1472.
20	5.88	32.65	20	25.74	226.9	0.45	0.05	1472.
30	5.85	32.65	30	25.74	226.8	0.68	0.10	1472.
50	5.87	32.65	50	25.74	227.3	1.13	0.29	1472.
75	5.85	32.65	75	25.74	227.2	1.70	0.65	1473.
100	5.83	32.66	99	25.75	226.8	2.27	1.16	1473.
125	5.72	32.78	124	25.86	216.5	2.83	1.80	1473.
150	5.16	33.61	149	26.58	148.3	3.24	2.37	1472.
175	5.13	33.75	174	26.69	138.0	3.60	2.96	1473.
200	4.84	33.77	199	26.74	133.3	3.94	3.61	1472.
225	4.65	33.78	223	26.77	130.7	4.27	4.32	1472.
250	4.53	33.79	248	26.79	128.8	4.59	5.11	1472.



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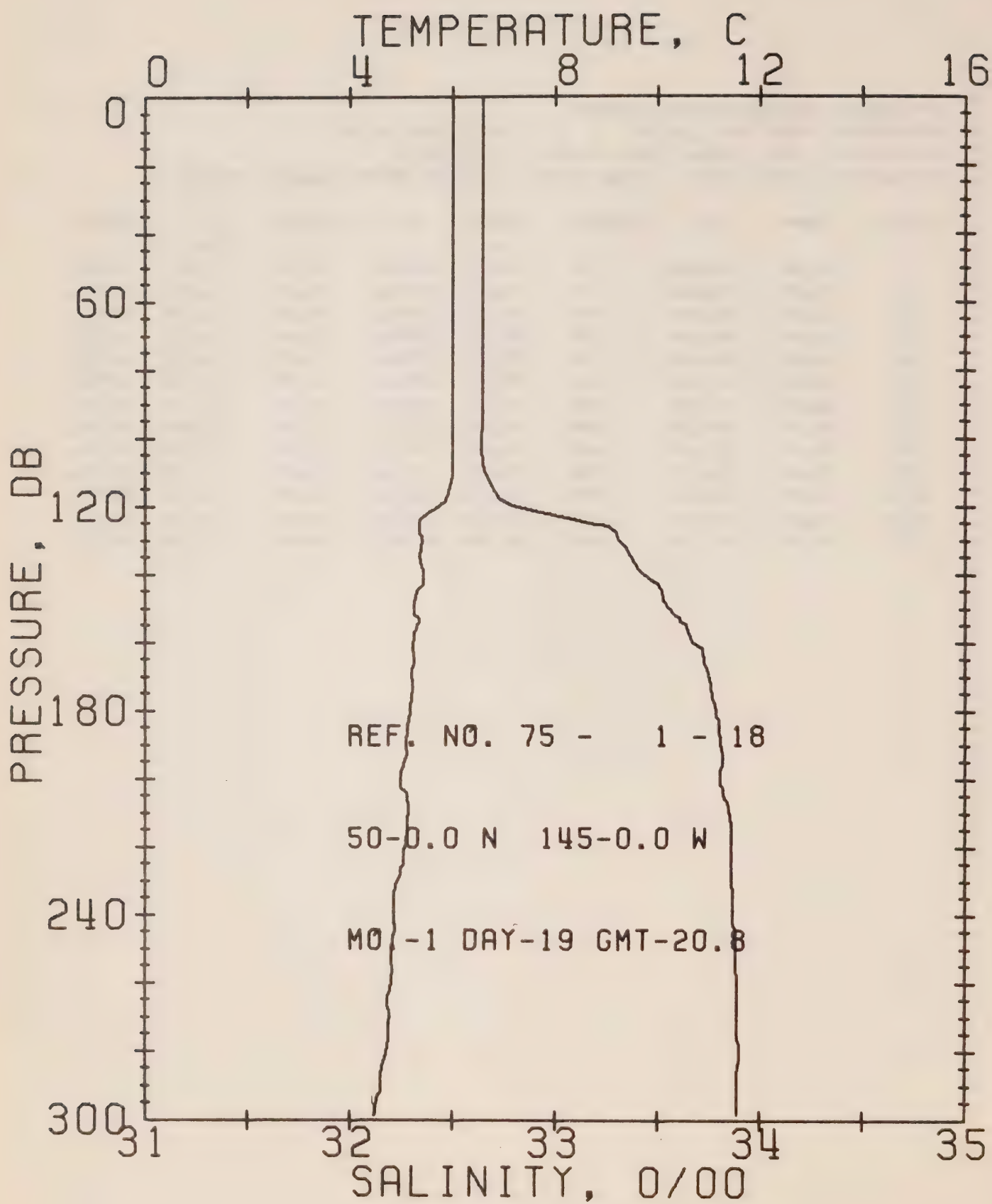
REFERENCE NO. 75- 1- 17

DATE 19/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 106 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.99	32.64	0	25.72	228.6	0.0	0.0	1472.
10	5.99	32.64	10	25.72	229.0	0.23	0.01	1472.
20	6.00	32.64	20	25.72	229.1	0.46	0.05	1472.
30	6.00	32.64	30	25.71	229.2	0.69	0.11	1472.
50	6.01	32.64	50	25.71	229.6	1.15	0.29	1473.
75	6.02	32.64	75	25.71	230.0	1.72	0.66	1473.
100	6.02	32.64	99	25.71	230.2	2.30	1.17	1474.
125	5.41	33.25	124	26.27	177.9	2.85	1.81	1472.
150	5.73	33.66	149	26.55	151.2	3.26	2.38	1475.
175	5.56	33.77	174	26.66	141.3	3.63	2.98	1475.
200	5.21	33.81	199	26.73	134.5	3.97	3.64	1474.
225	5.05	33.82	223	26.76	132.1	4.30	4.36	1473.
250	4.61	33.81	248	26.80	128.1	4.63	5.14	1472.



OFFSHORE OCEANOGRAPHY GROUP

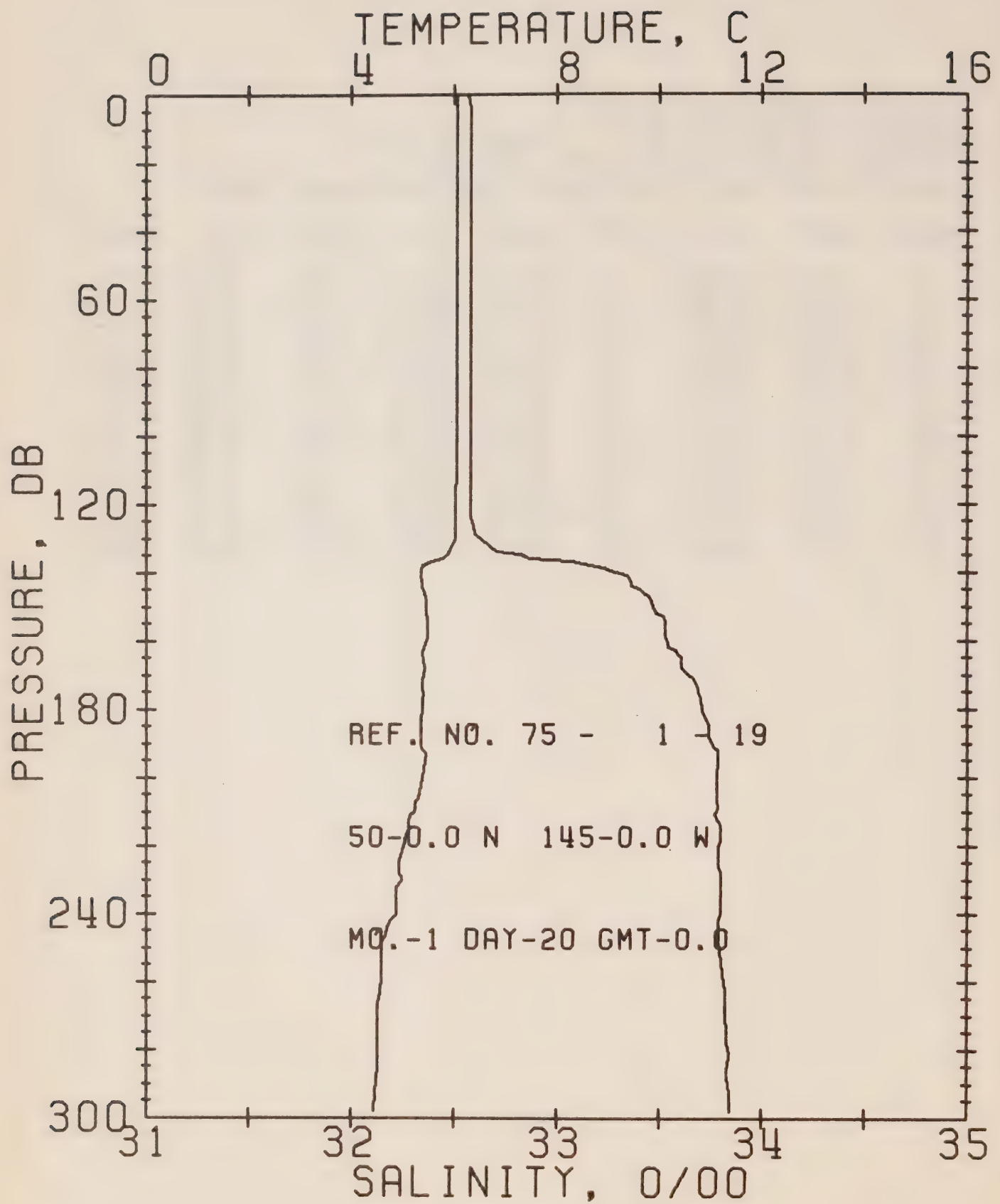
REFERENCE NO. 75- 1- 18

DATE 19/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 20.8

RESULTS OF STP CAST 114 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	PCT. EN	SOUND
0	6.00	32.65	0	25.72	227.9	0.0	0.0	1472.
10	6.00	32.65	10	25.72	228.3	0.23	0.01	1472.
20	6.00	32.65	20	25.72	228.4	0.46	0.05	1472.
30	6.00	32.65	30	25.72	228.5	0.68	0.10	1472.
50	6.00	32.65	50	25.72	228.7	1.14	0.29	1473.
75	6.00	32.65	75	25.72	229.1	1.71	0.66	1473.
100	6.00	32.64	99	25.72	229.8	2.29	1.17	1474.
125	5.36	33.16	124	26.20	184.0	2.84	1.80	1472.
150	5.24	33.55	149	26.53	153.4	3.26	2.38	1473.
175	5.21	33.77	174	26.70	137.2	3.62	2.97	1473.
200	4.99	33.81	199	26.76	131.9	3.95	3.61	1473.
225	5.03	33.86	223	26.79	129.0	4.28	4.32	1473.
250	4.81	33.88	248	26.83	125.2	4.59	5.09	1473.



OFFSHORE OCEANOGRAPHY GROUP

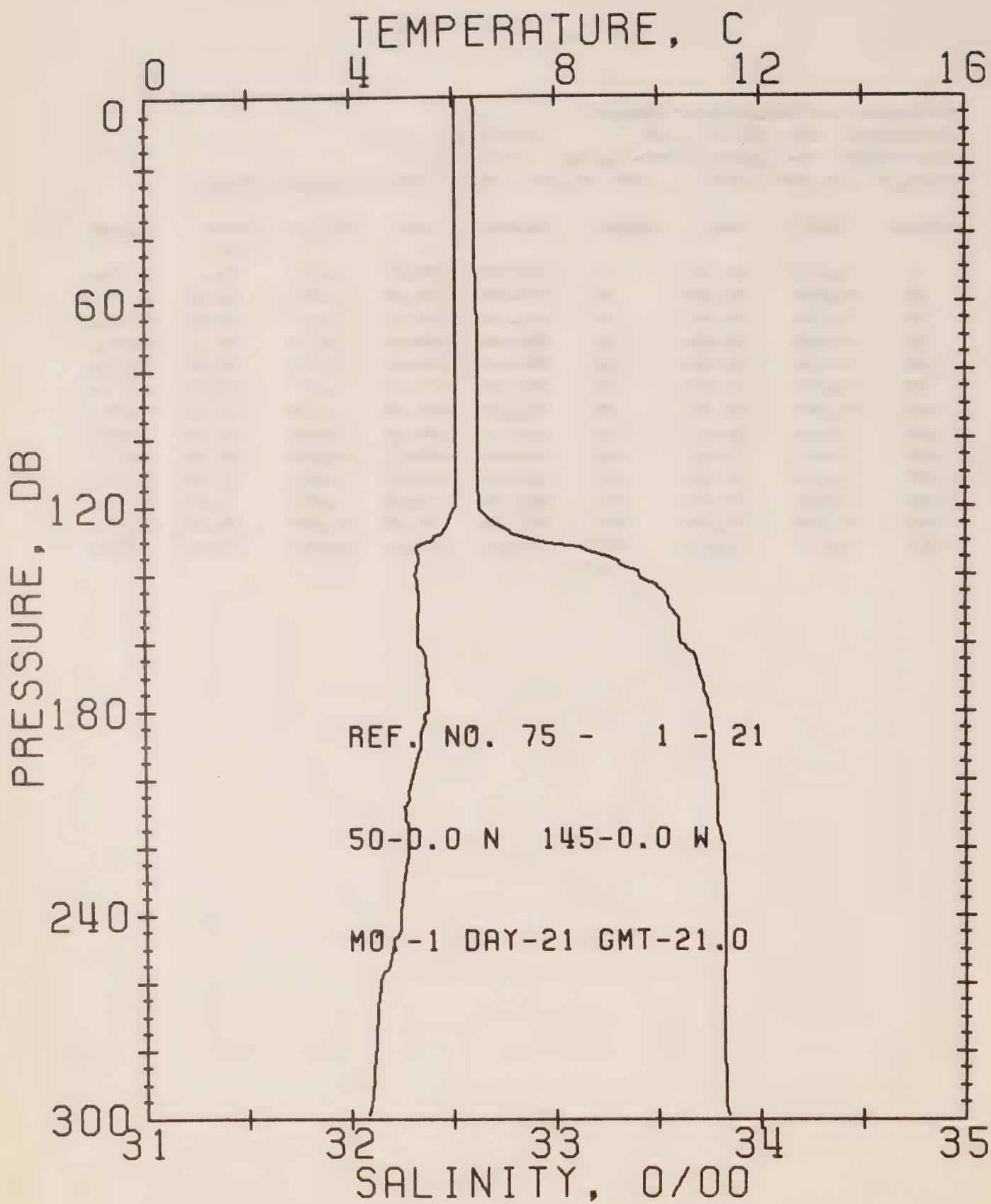
REFERENCE NO. 75- 1- 19

DATE 20/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 0.0

RESULTS OF STP CAST 97 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.04	32.57	0	25.65	234.4	0.0	0.0	1472.
10	6.04	32.58	10	25.66	234.0	0.23	0.01	1472.
20	6.04	32.58	20	25.66	234.1	0.47	0.05	1472.
30	6.04	32.58	30	25.66	234.2	0.70	0.11	1473.
50	6.04	32.58	50	25.66	234.4	1.17	0.30	1473.
75	6.04	32.58	75	25.66	234.7	1.76	0.67	1473.
100	6.04	32.58	99	25.66	235.0	2.34	1.20	1474.
125	6.03	32.58	124	25.67	234.8	2.93	1.87	1474.
150	5.47	33.47	149	26.43	162.3	3.43	2.56	1473.
175	5.41	33.69	174	26.61	145.5	3.81	3.19	1474.
200	5.39	33.78	199	26.69	138.6	4.16	3.87	1474.
225	4.93	33.79	223	26.75	133.1	4.50	4.60	1473.
250	4.60	33.79	248	26.79	129.4	4.83	5.40	1472.



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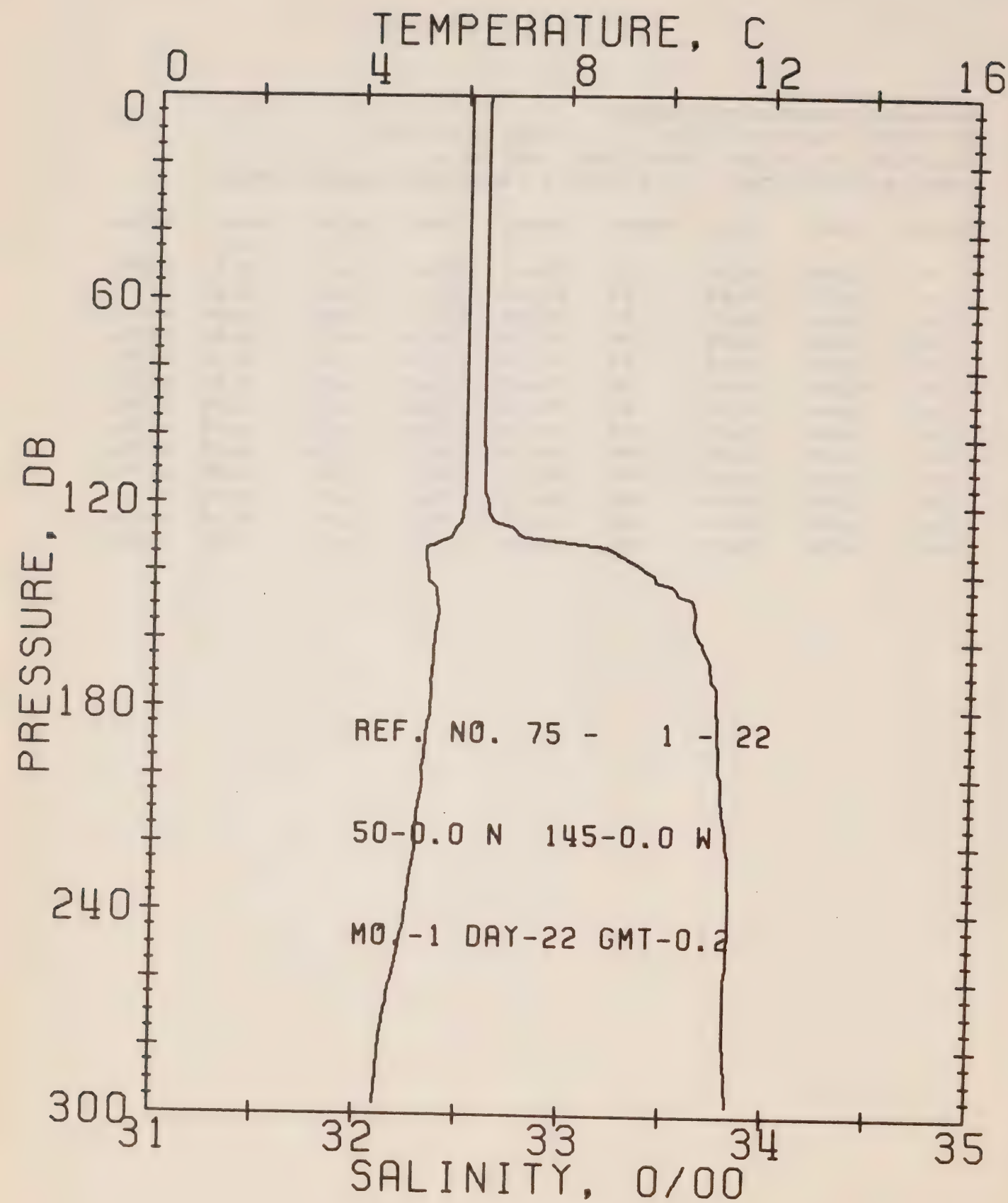
REFERENCE NO. 75- 1- 21

DATE 21/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 21.0

RESULTS OF STP CAST 112 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.04	32.60	0	25.68	232.2	0.0	0.0	1472.
10	6.04	32.61	10	25.69	231.7	0.23	0.01	1472.
20	6.04	32.61	20	25.69	231.8	0.46	0.05	1472.
30	6.04	32.61	30	25.69	231.9	0.70	0.11	1473.
50	6.04	32.61	50	25.69	232.1	1.16	0.30	1473.
75	6.04	32.62	75	25.69	231.7	1.74	0.66	1473.
100	6.04	32.62	99	25.69	232.0	2.32	1.18	1474.
125	5.89	32.71	124	25.78	223.8	2.90	1.84	1474.
150	5.33	33.56	149	26.52	154.0	3.34	2.47	1473.
175	5.51	33.73	174	26.63	143.9	3.71	3.08	1474.
200	5.19	33.78	199	26.71	136.3	4.06	3.75	1473.
225	5.08	33.82	223	26.76	132.5	4.40	4.47	1473.
250	4.80	33.83	248	26.80	128.8	4.72	5.26	1473.



OFFSHORE OCEANOGRAPHY GROUP

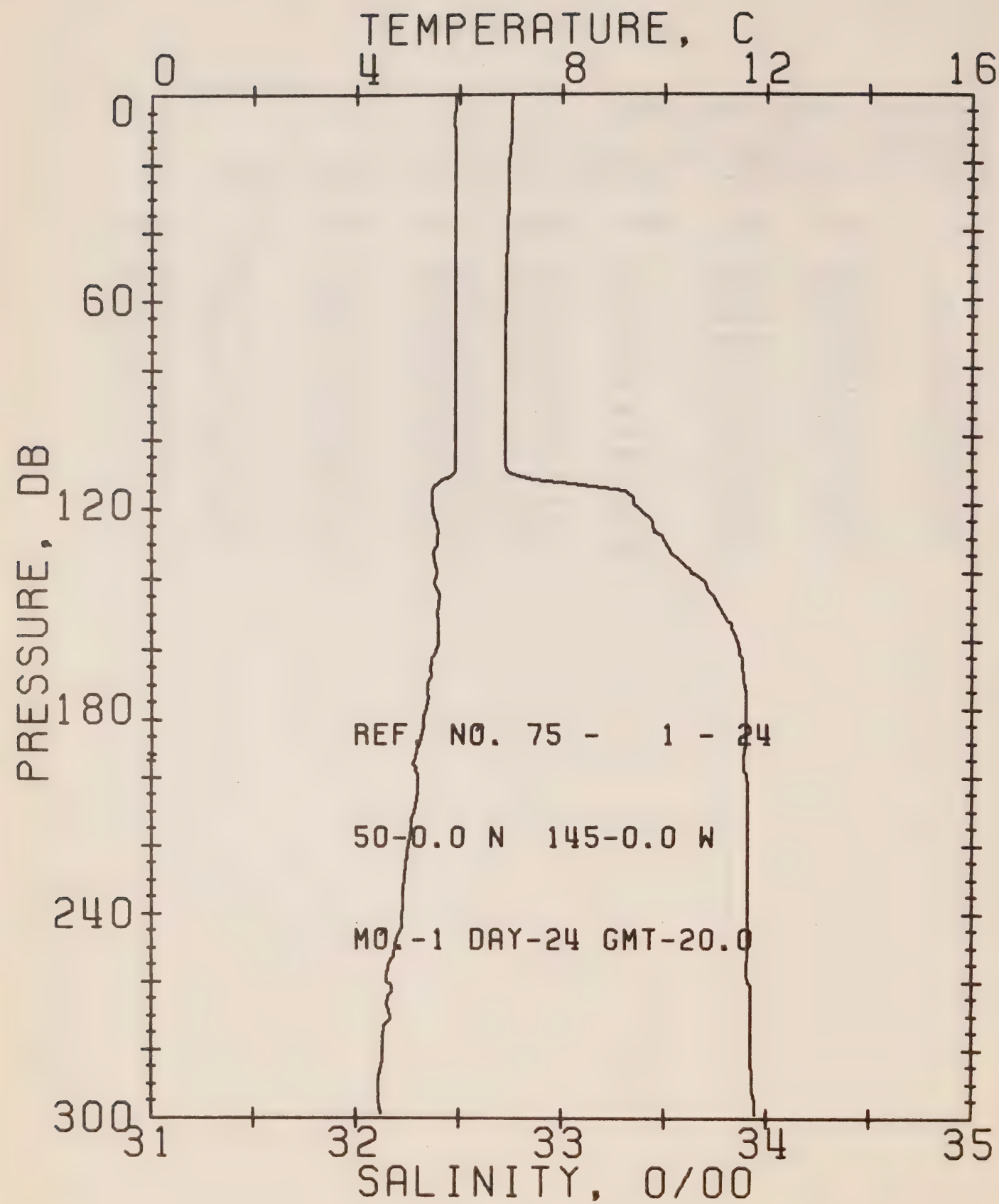
REFERENCE NO. 75- 1- 22

DATE 22/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 0.2

RESULTS OF STP CAST 93 FCINTS TAKEN FROM ANALCG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.05	32.61	0	25.69	231.6	0.0	0.0	1472.
10	6.05	32.60	10	25.68	232.6	0.23	0.01	1472.
20	6.04	32.60	20	25.68	232.6	0.47	0.05	1472.
30	6.04	32.60	30	25.68	232.8	0.70	0.11	1473.
50	6.04	32.60	50	25.68	233.0	1.16	0.30	1473.
75	6.04	32.60	75	25.68	233.3	1.75	0.67	1473.
100	6.04	32.60	99	25.68	233.3	2.33	1.19	1474.
125	5.98	32.65	124	25.73	229.4	2.91	1.85	1474.
150	5.55	33.64	149	26.56	150.5	3.36	2.48	1474.
175	5.44	33.75	174	26.66	141.3	3.73	3.08	1474.
200	5.28	33.77	199	26.70	137.9	4.07	3.75	1474.
225	5.10	33.82	223	26.75	132.8	4.41	4.48	1474.
250	4.85	33.82	248	26.78	130.1	4.74	5.28	1473.



OFFSHORE OCEANOGRAPHY GROUP

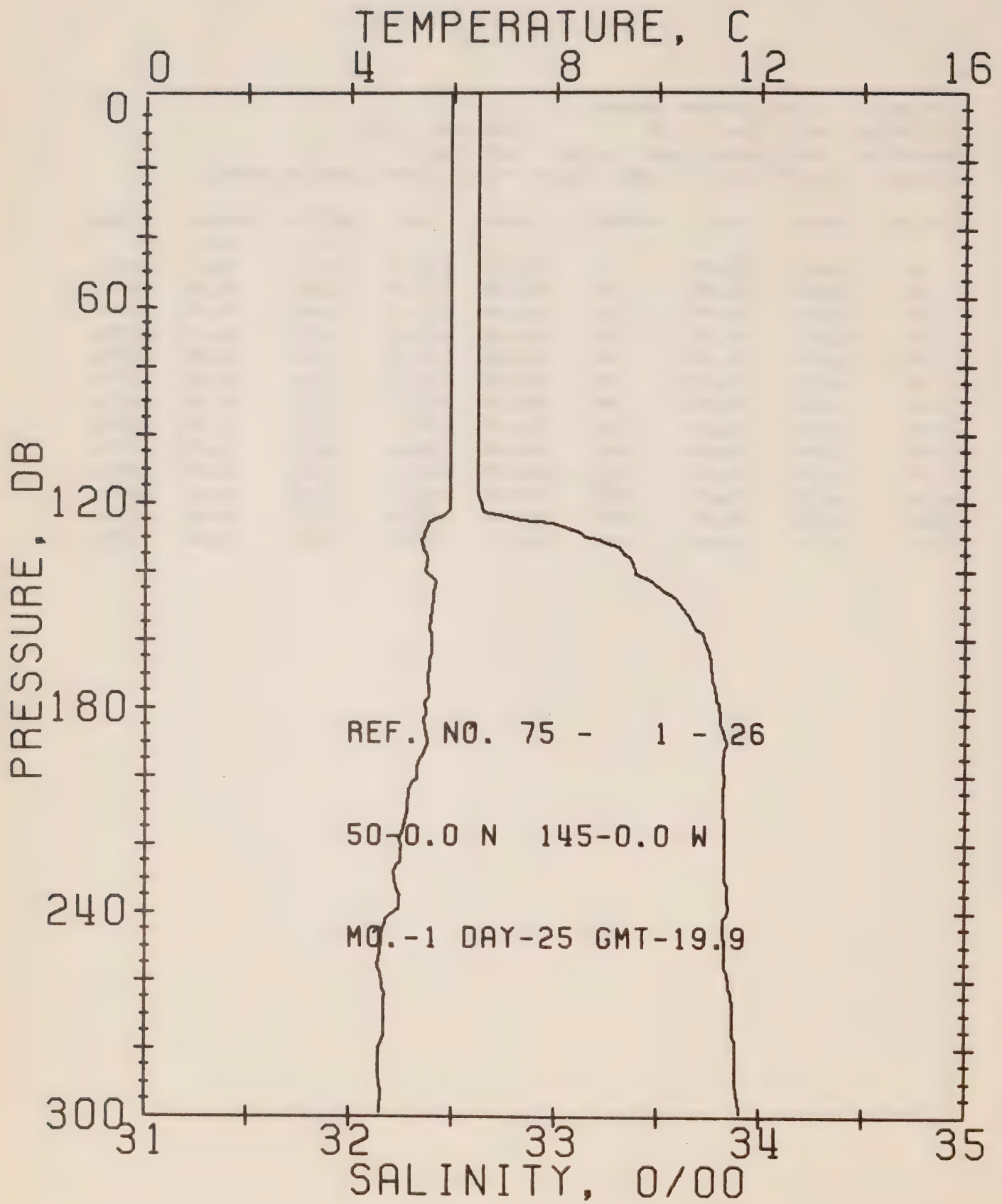
REFERENCE NO. 75- 1- 24

DATE 24/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 20.0

RESULTS OF STD CAST 106 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.93	32.76	0	25.82	218.9	0.0	0.0	1472.
10	5.91	32.75	10	25.81	219.7	0.22	0.01	1472.
20	5.92	32.74	20	25.80	220.6	0.44	0.04	1472.
30	5.93	32.74	30	25.80	221.0	0.66	0.10	1472.
50	5.92	32.73	50	25.80	221.7	1.10	0.28	1473.
75	5.92	32.72	75	25.79	222.8	1.66	0.64	1473.
100	5.93	32.72	99	25.79	223.2	2.22	1.13	1473.
125	5.56	33.44	124	26.40	165.4	2.71	1.70	1473.
150	5.59	33.76	149	26.65	141.8	3.10	2.24	1474.
175	5.38	33.90	174	26.78	129.4	3.43	2.79	1474.
200	5.21	33.90	199	26.80	127.7	3.76	3.41	1474.
225	4.96	33.91	223	26.84	124.4	4.07	4.09	1473.
250	4.73	33.91	248	26.87	122.1	4.39	4.84	1473.



OFFSHORE OCEANOGRAPHY GROUP

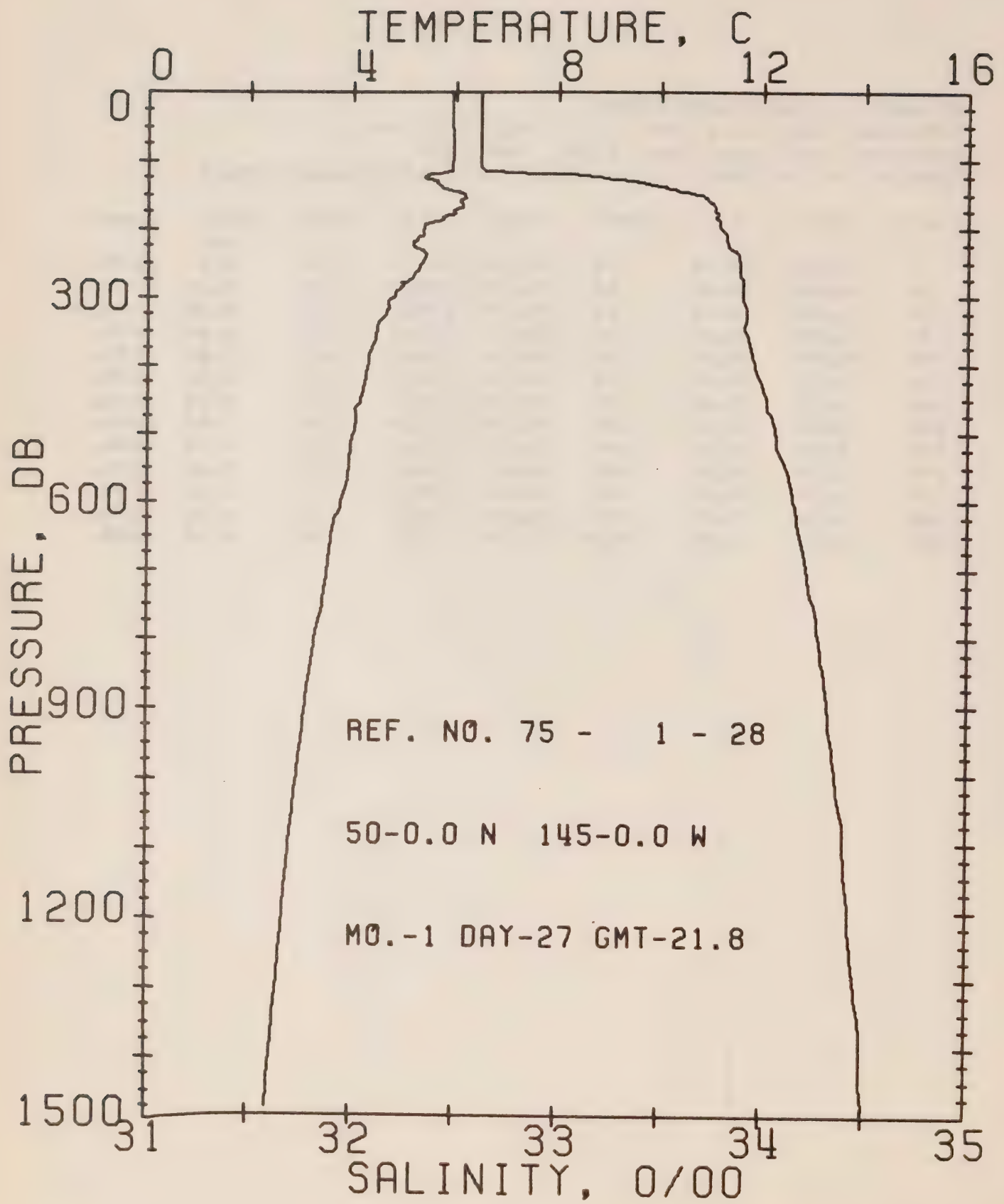
REFERENCE NO. 75- 1- 26

DATE 25/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 19.9

RESULTS OF STP CAST 116 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.95	32.62	0	25.71	229.7	0.0	0.0	1472.
10	5.95	32.62	10	25.70	230.0	0.23	0.01	1472.
20	5.96	32.62	20	25.70	230.2	0.46	0.05	1472.
30	5.96	32.62	30	25.70	230.3	0.69	0.11	1472.
50	5.96	32.62	50	25.70	230.5	1.15	0.29	1473.
75	5.95	32.62	75	25.71	230.7	1.73	0.66	1473.
100	5.95	32.62	99	25.70	231.0	2.30	1.18	1473.
125	5.59	32.83	124	25.91	211.4	2.88	1.83	1473.
150	5.61	33.61	149	26.53	153.3	3.31	2.44	1474.
175	5.55	33.78	174	26.67	140.1	3.67	3.04	1474.
200	5.31	33.83	199	26.73	134.4	4.01	3.69	1474.
225	4.99	33.83	223	26.77	130.7	4.34	4.40	1473.
250	4.60	33.83	248	26.82	126.7	4.67	5.18	1472.



OFFSHORE OCEANOGRAPHY GROUP

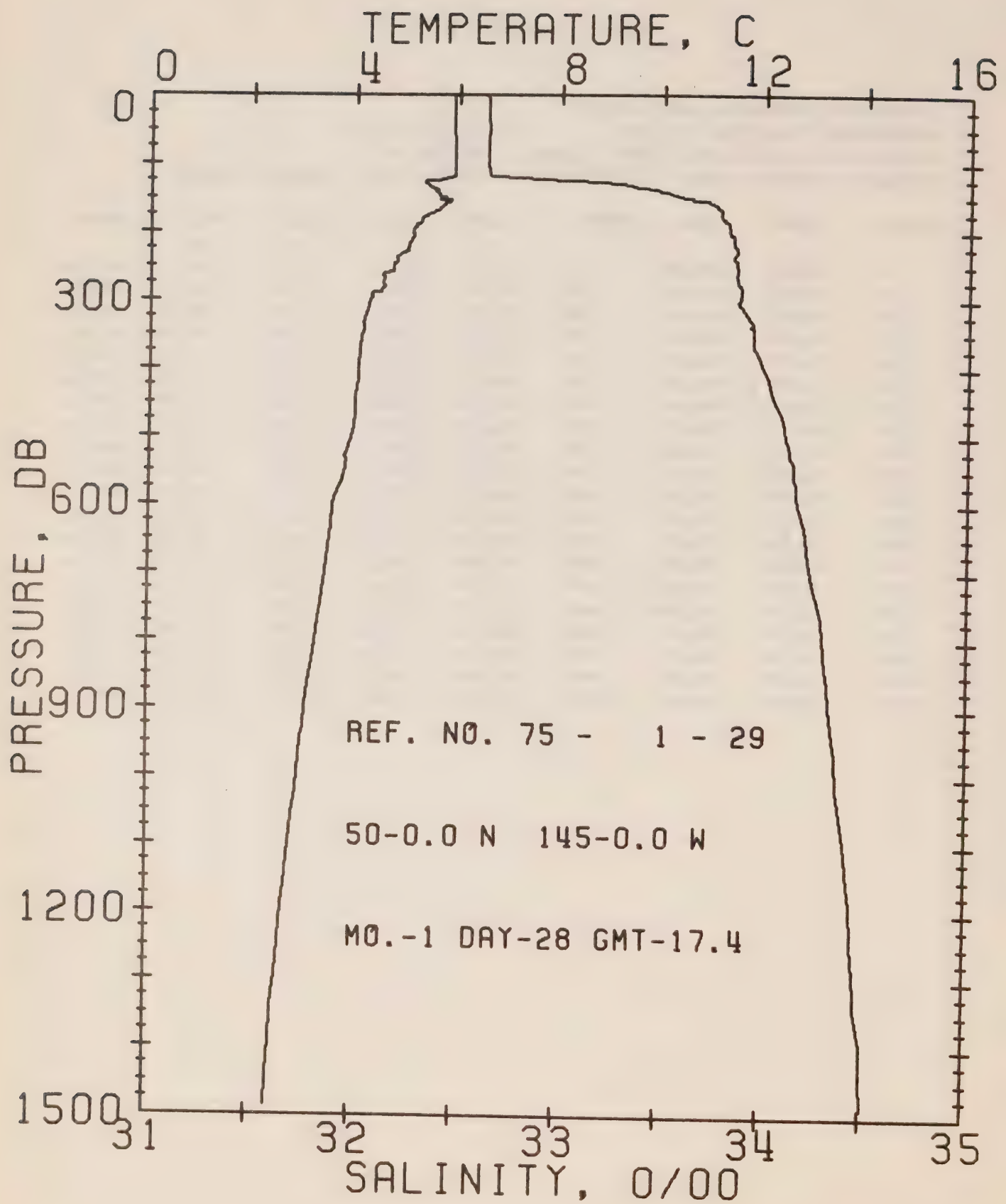
REFERENCE NO. 75- 1- 28

DATE 27/ 1/75

POSITION 50- 0.0N. 145- 0.0W GMT 21.8

RESULTS OF STP CAST 203 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.93	32.62	0	25.71	229.4	0.0	0.0	1472.
10	5.93	32.62	10	25.71	229.7	0.23	0.01	1472.
20	5.93	32.62	20	25.71	229.8	0.46	0.05	1472.
30	5.93	32.62	30	25.71	229.9	0.69	0.11	1472.
50	5.93	32.62	50	25.71	230.2	1.15	0.29	1472.
75	5.94	32.62	75	25.71	230.5	1.73	0.66	1473.
100	5.94	32.62	99	25.71	230.8	2.30	1.17	1473.
125	5.38	33.23	124	26.25	178.9	2.85	1.80	1472.
150	6.20	33.68	149	26.51	155.4	3.26	2.38	1477.
175	5.96	33.77	174	26.61	146.0	3.64	3.00	1476.
200	5.37	33.80	199	26.71	137.2	3.99	3.67	1474.
225	5.18	33.83	223	26.75	132.9	4.33	4.40	1474.
250	5.34	33.89	248	26.78	130.5	4.66	5.20	1475.
300	4.82	33.90	298	26.85	124.3	5.29	6.99	1474.
400	4.31	33.96	397	26.95	115.1	6.49	11.24	1473.
500	4.02	34.06	496	27.07	105.1	7.59	16.27	1474.
600	3.79	34.15	595	27.16	97.0	8.60	21.92	1475.
800	3.28	34.28	793	27.31	83.5	10.40	34.72	1476.
1000	2.95	34.36	990	27.41	74.9	11.98	49.19	1478.
1200	2.69	34.43	1188	27.48	68.2	13.40	65.16	1480.



OFFSHORE OCEANOGRAPHY GROUP

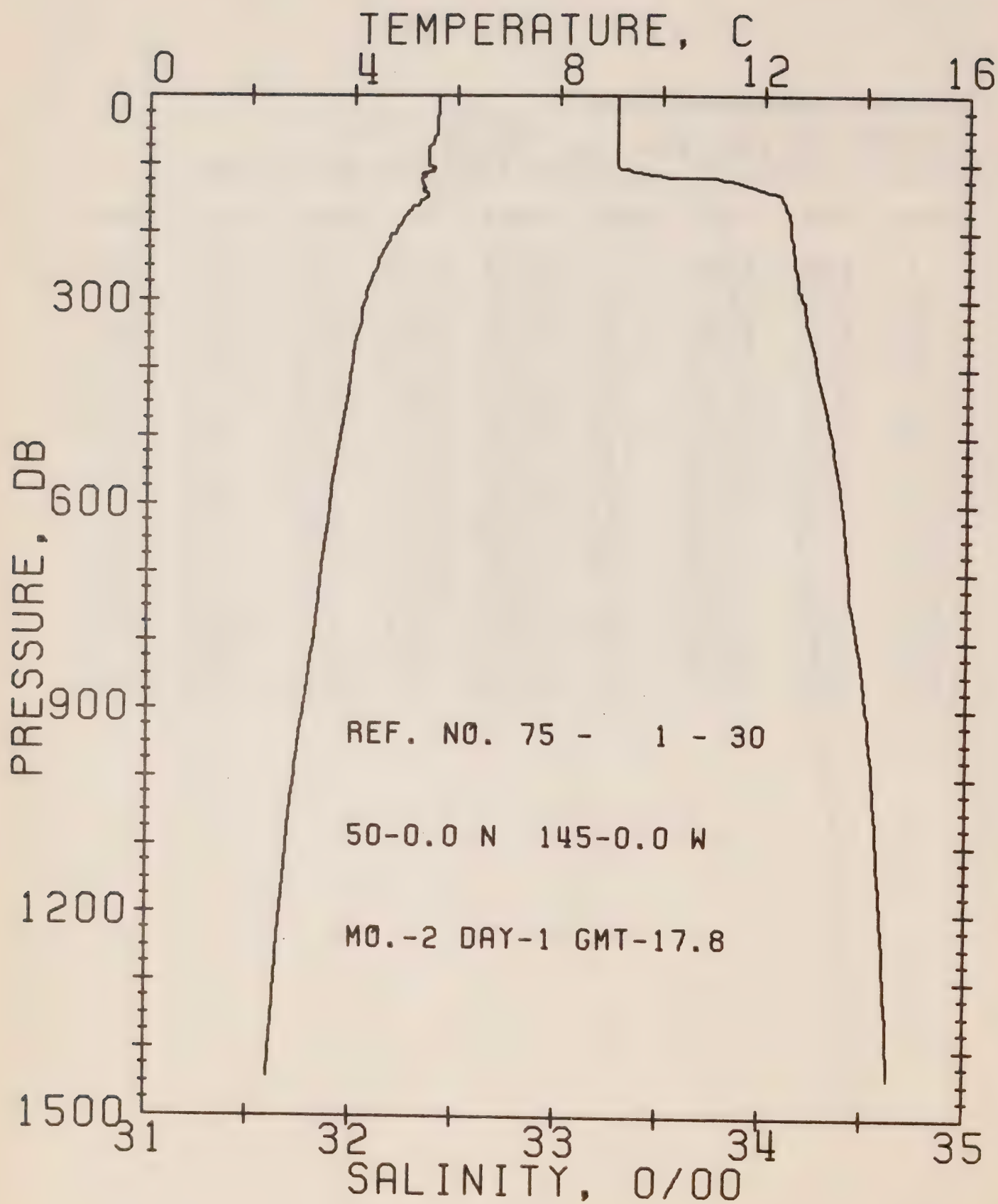
REFERENCE NO. 75- 1- 29

DATE 28/ 1/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.4

RESULTS OF STP CAST 196 FCINTS TAKEN FROM ANALCG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.90	32.63	0	25.72	228.3	0.0	0.0	1472.
10	5.90	32.64	10	25.73	227.9	0.23	0.01	1472.
20	5.90	32.64	20	25.73	228.0	0.46	0.05	1472.
30	5.90	32.64	30	25.73	228.1	0.68	0.10	1472.
50	5.90	32.65	50	25.73	227.6	1.14	0.29	1472.
75	5.91	32.64	75	25.73	228.7	1.71	0.65	1473.
100	5.91	32.64	99	25.73	229.0	2.28	1.16	1473.
125	5.62	33.02	124	26.06	197.4	2.85	1.81	1473.
150	5.77	33.64	149	26.53	153.2	3.26	2.39	1475.
175	5.42	33.78	174	26.68	138.9	3.63	2.99	1474.
200	5.12	33.82	199	26.76	132.3	3.96	3.63	1473.
225	5.02	33.86	223	26.79	128.8	4.29	4.34	1473.
250	4.76	33.86	248	26.83	125.9	4.61	5.11	1473.
300	4.29	33.88	298	26.89	120.0	5.22	6.83	1471.
400	4.08	34.00	397	27.01	109.8	6.36	10.90	1472.
500	3.97	34.11	496	27.10	101.3	7.42	15.72	1474.
600	3.60	34.17	595	27.19	93.4	8.39	21.15	1474.
800	3.27	34.30	793	27.32	82.0	10.14	33.61	1476.
1000	2.95	34.37	990	27.41	74.6	11.70	47.91	1478.
1200	2.66	34.44	1188	27.49	67.0	13.11	63.72	1480.



OFFSHORE OCEANOGRAPHY GROUP

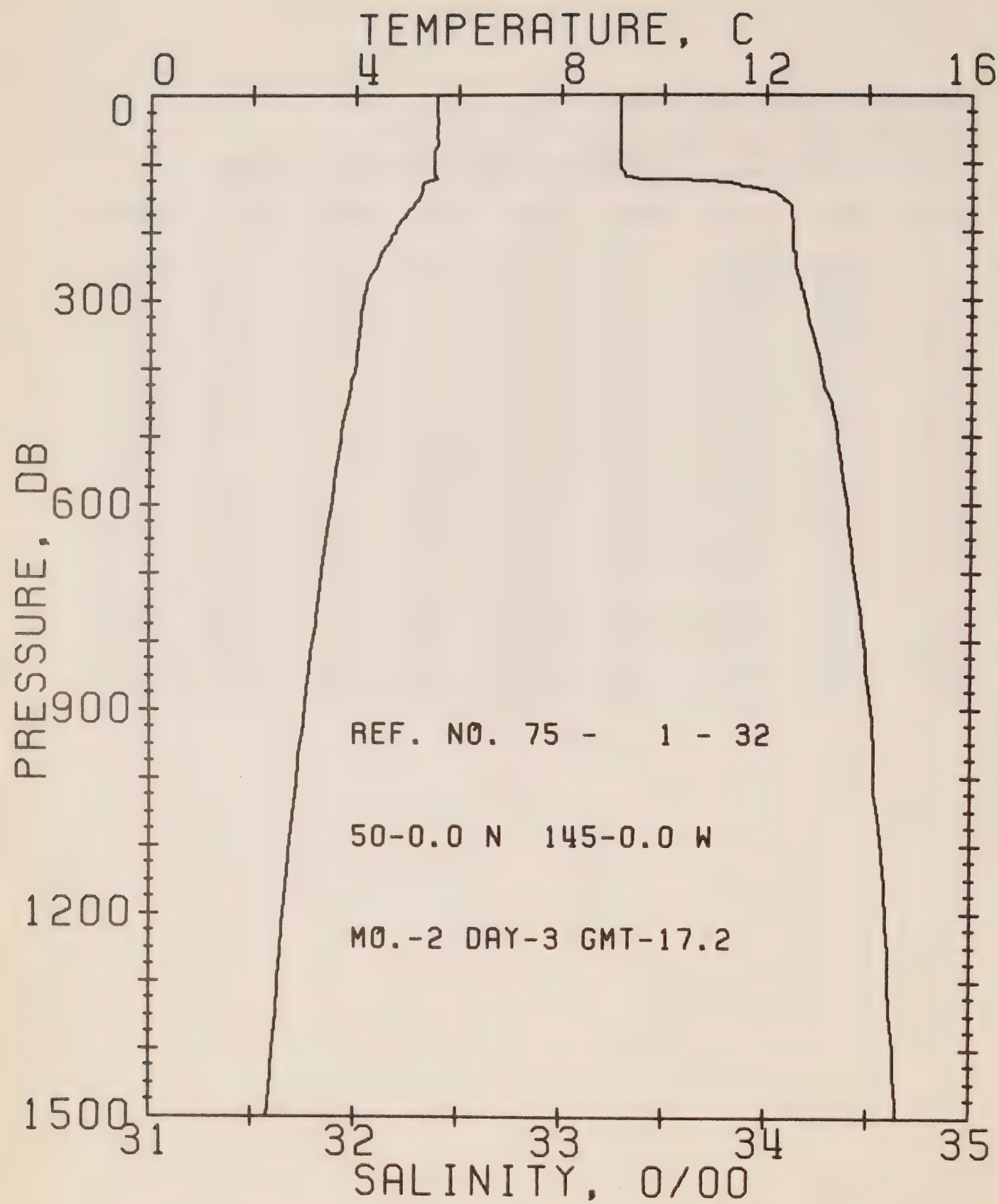
REFERENCE NO. 75- 1- 30

DATE 1/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 171 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.62	33.28	0	26.27	176.4	0.0	0.0	1471.
10	5.62	33.28	10	26.27	176.7	0.18	0.01	1471.
20	5.62	33.28	20	26.27	176.8	0.35	0.04	1472.
30	5.61	33.28	30	26.27	176.9	0.53	0.08	1472.
50	5.59	33.28	50	26.27	176.8	0.88	0.23	1472.
75	5.44	33.28	74	26.29	175.3	1.33	0.51	1472.
100	5.45	33.28	99	26.29	175.7	1.76	0.90	1472.
125	5.32	33.86	124	26.76	131.2	2.17	1.36	1473.
150	5.40	34.08	149	26.93	115.6	2.48	1.79	1474.
175	5.00	34.12	174	27.00	108.6	2.76	2.25	1473.
200	4.82	34.13	199	27.03	106.2	3.02	2.77	1472.
225	4.60	34.14	223	27.06	103.2	3.29	3.33	1472.
250	4.45	34.15	248	27.09	101.1	3.54	3.95	1472.
300	4.24	34.19	298	27.14	96.3	4.03	5.33	1472.
400	3.97	34.26	397	27.23	89.0	4.96	8.62	1472.
500	3.75	34.34	496	27.31	81.7	5.81	12.52	1473.
600	3.57	34.39	595	27.37	76.9	6.60	16.96	1474.
800	3.26	34.47	792	27.46	69.2	8.07	27.39	1476.
1000	2.89	34.54	990	27.55	61.0	9.36	39.22	1478.
1200	2.62	34.59	1188	27.61	55.9	10.53	52.29	1480.



OFFSHORE OCEANOGRAPHY GROUP

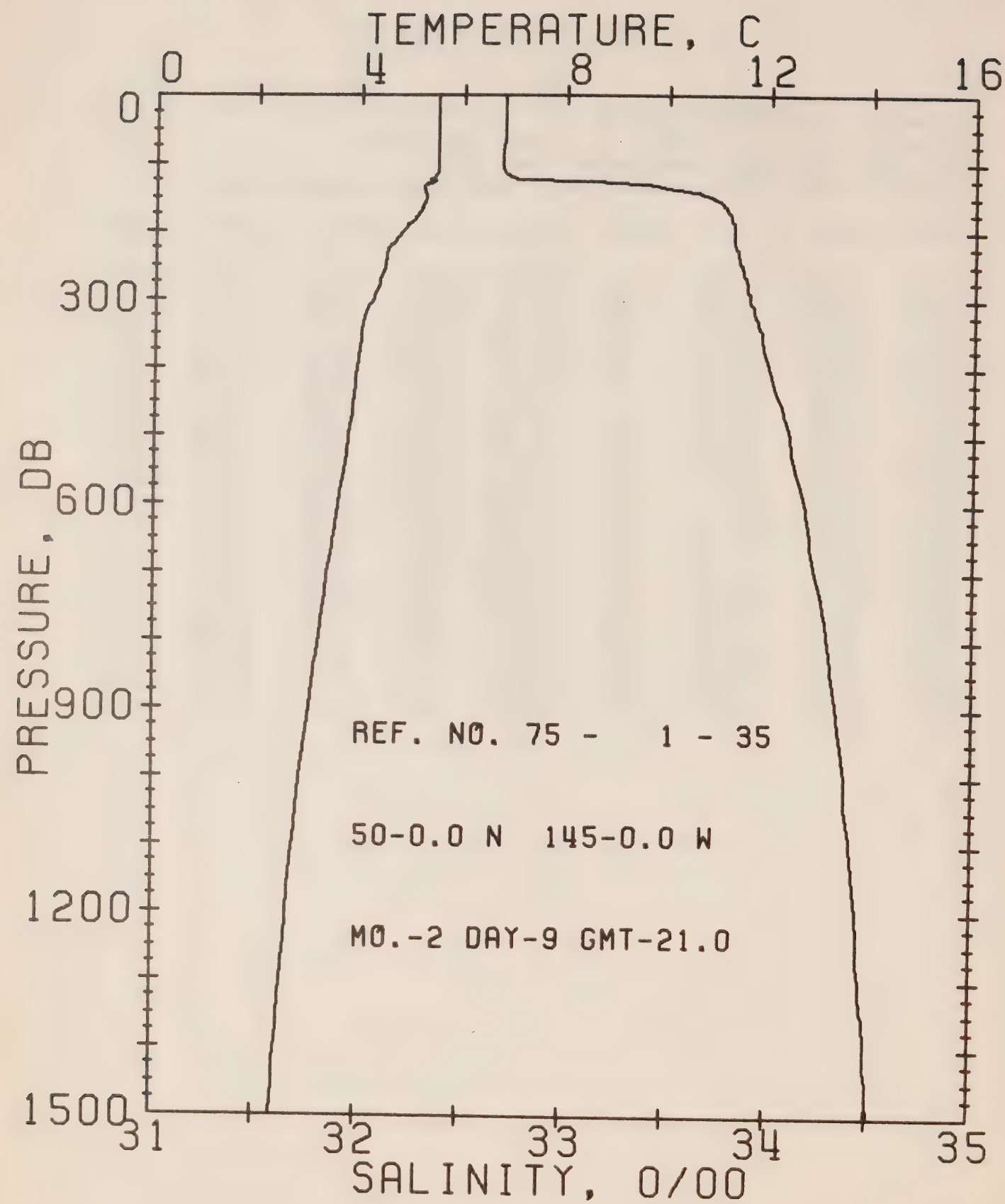
REFERENCE NO. 75- 1- 32

DATE 3/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.2

RESULTS OF STP CAST 147 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.57	33.30	0	26.29	174.3	0.0	0.0	1471.
10	5.57	33.29	10	26.28	175.5	0.18	0.01	1471.
20	5.58	33.29	20	26.28	175.7	0.35	0.04	1471.
30	5.58	33.29	30	26.28	175.8	0.53	0.08	1472.
50	5.58	33.29	50	26.28	176.0	0.88	0.22	1472.
75	5.58	33.29	74	26.28	176.3	1.32	0.50	1472.
100	5.52	33.29	99	26.29	175.8	1.76	0.90	1472.
125	5.48	33.66	124	26.58	148.0	2.19	1.39	1473.
150	5.23	34.07	149	26.94	114.5	2.50	1.83	1473.
175	4.98	34.12	174	27.00	108.4	2.78	2.29	1473.
200	4.77	34.13	199	27.04	105.6	3.05	2.80	1472.
225	4.55	34.13	223	27.06	103.4	3.31	3.36	1472.
250	4.41	34.14	248	27.08	101.4	3.56	3.98	1471.
300	4.15	34.19	298	27.15	95.3	4.05	5.35	1471.
400	4.00	34.27	397	27.23	89.0	4.98	8.64	1472.
500	3.74	34.35	496	27.32	80.7	5.82	12.51	1473.
600	3.55	34.40	595	27.38	76.1	6.61	16.90	1474.
800	3.19	34.48	792	27.48	67.2	8.05	27.14	1476.
1000	2.89	34.53	990	27.54	61.8	9.33	38.88	1478.
1200	2.61	34.59	1188	27.62	55.7	10.50	51.98	1480.



OFFSHORE OCEANOGRAPHY GROUP

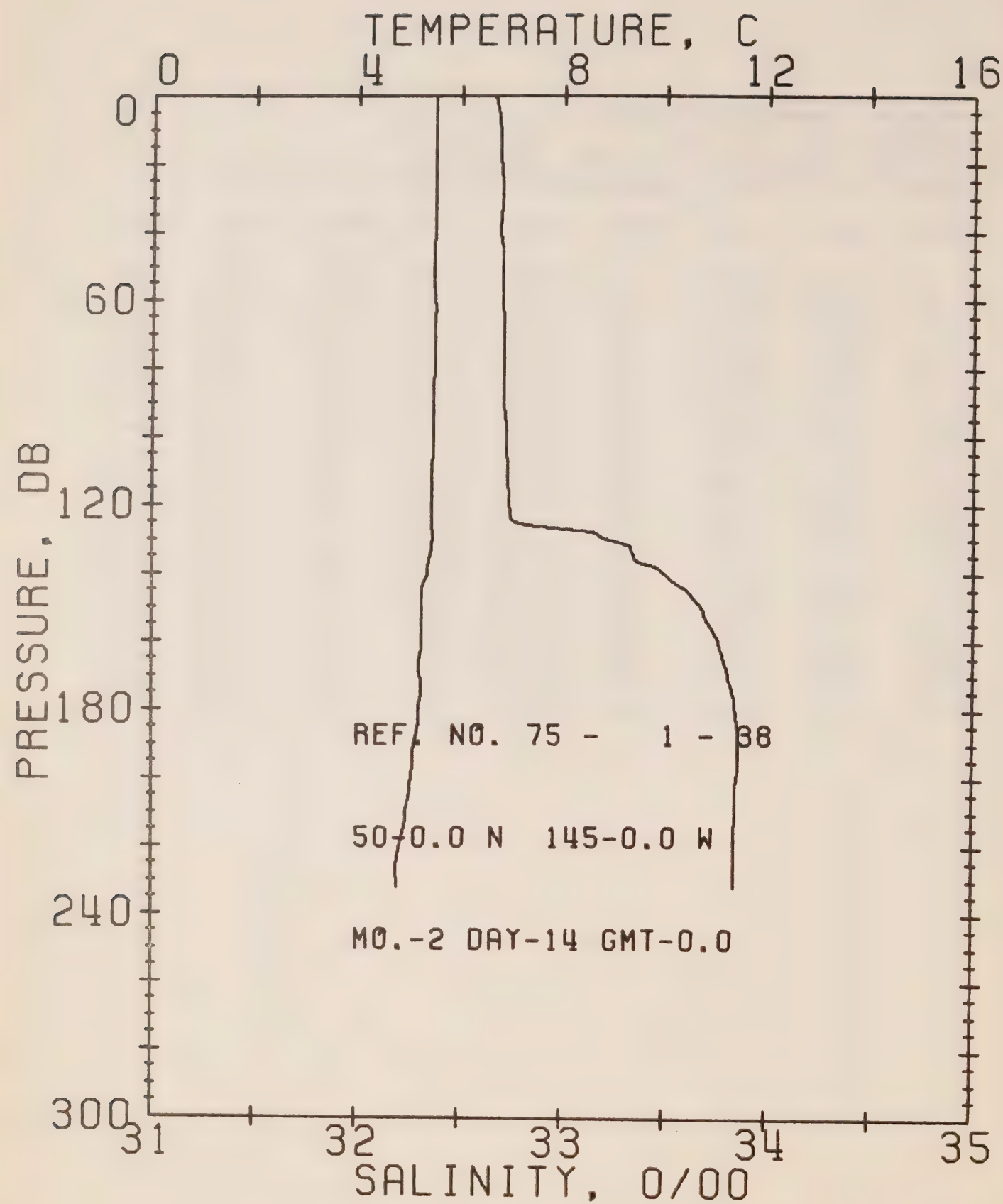
REFERENCE NO. 75- 1- 35

DATE 9/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 21.0

RESULTS OF STP CAST 174 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.49	32.70	0	25.82	218.4	0.0	0.0	1470.
10	5.50	32.70	10	25.82	218.8	0.22	0.01	1470.
20	5.50	32.70	20	25.82	218.9	0.44	0.04	1470.
30	5.50	32.70	30	25.82	219.0	0.66	0.10	1470.
50	5.50	32.70	50	25.82	219.2	1.09	0.28	1471.
75	5.50	32.69	75	25.82	219.9	1.64	0.63	1471.
100	5.50	32.69	99	25.81	220.5	2.19	1.12	1472.
125	5.43	33.07	124	26.12	191.5	2.74	1.75	1472.
150	5.27	33.71	149	26.65	141.8	3.13	2.29	1473.
175	5.12	33.80	174	26.74	133.6	3.47	2.86	1473.
200	4.81	33.82	199	26.79	129.2	3.80	3.49	1472.
225	4.55	33.83	223	26.83	125.5	4.12	4.18	1471.
250	4.48	33.86	248	26.85	123.1	4.43	4.93	1471.
300	4.25	33.90	298	26.91	118.1	5.04	6.62	1471.
400	3.94	34.00	397	27.02	108.5	6.16	10.62	1472.
500	3.79	34.10	496	27.12	100.0	7.20	15.39	1473.
600	3.60	34.18	595	27.20	93.0	8.17	20.82	1474.
800	3.23	34.29	793	27.33	81.7	9.92	33.27	1476.
1000	2.89	34.38	990	27.43	72.9	11.47	47.43	1478.
1200	2.64	34.44	1188	27.49	66.9	12.87	63.13	1480.



OFFSHORE OCEANOGRAPHY GROUP

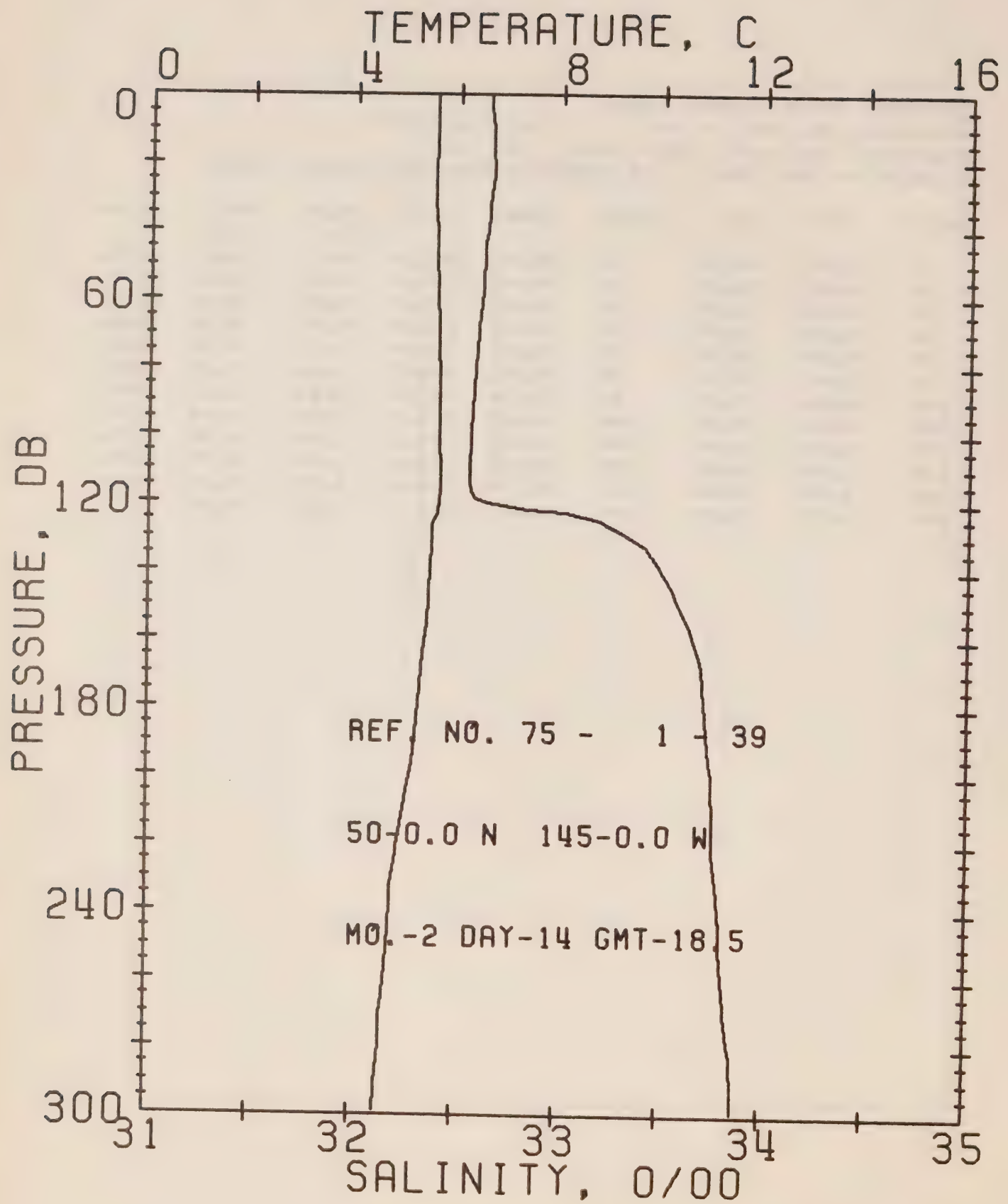
REFERENCE NO. 75- 1- 38

DATE 14/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 0.0

RESULTS OF STD CAST 83 POINTS TAKEN FROM ANALCG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.49	32.66	0	25.79	221.4	0.0	0.0	1470.
10	5.48	32.69	10	25.81	219.6	0.22	0.01	1470.
20	5.48	32.69	20	25.82	219.3	0.44	0.04	1470.
30	5.48	32.70	30	25.82	218.9	0.66	0.10	1470.
50	5.47	32.70	50	25.83	218.9	1.10	0.28	1471.
75	5.49	32.71	75	25.83	218.7	1.64	0.63	1471.
100	5.46	32.72	99	25.84	217.8	2.19	1.11	1471.
125	5.45	32.76	124	25.88	214.9	2.73	1.74	1472.
150	5.25	33.67	149	26.62	144.5	3.15	2.32	1473.
175	5.24	33.83	174	26.75	133.0	3.50	2.89	1473.
200	5.06	33.96	199	26.79	129.3	3.82	3.51	1473.
225	4.78	33.84	223	26.81	127.7	4.14	4.21	1472.



OFFSHORE OCEANOGRAPHY GROUP

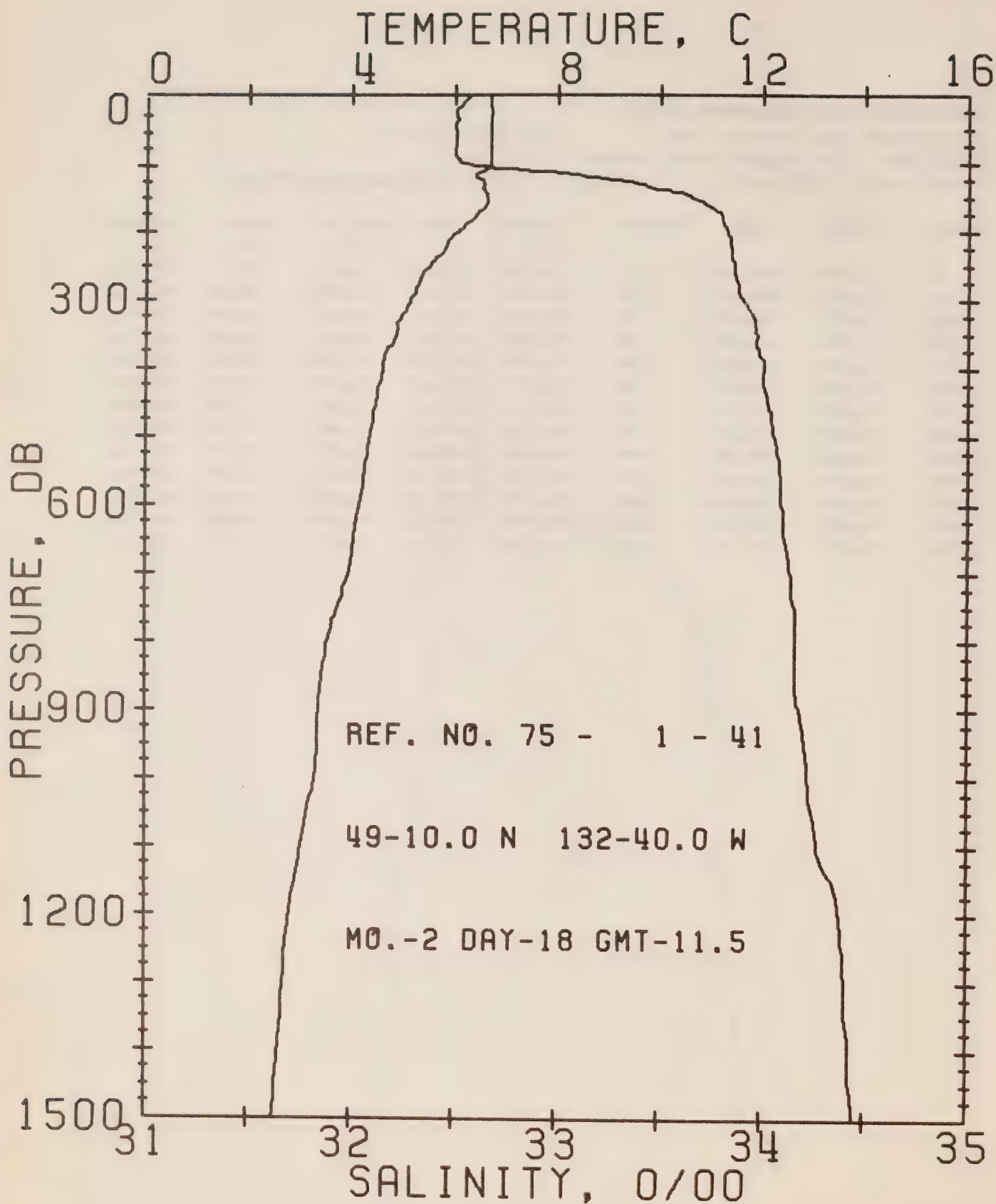
REFERENCE NO. 75- 1- 39

DATE 14/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 18.5

RESULTS OF STP CAST 60 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.55	32.65	0	25.78	222.9	0.0	0.0	1470.
10	5.54	32.66	10	25.79	222.3	0.22	0.01	1470.
20	5.53	32.67	20	25.79	221.8	0.45	0.05	1470.
30	5.53	32.66	30	25.78	222.7	0.67	0.10	1471.
50	5.57	32.63	50	25.76	225.5	1.12	0.28	1471.
75	5.63	32.59	75	25.72	228.9	1.68	0.65	1472.
100	5.66	32.57	99	25.70	231.3	2.26	1.16	1472.
125	5.55	33.20	124	26.21	183.1	2.82	1.81	1473.
150	5.46	33.59	149	26.53	153.4	3.23	2.38	1473.
175	5.30	33.71	174	26.64	142.6	3.60	2.99	1473.
200	5.12	33.75	199	26.70	137.9	3.95	3.66	1473.
225	4.85	33.76	223	26.74	134.1	4.29	4.40	1472.
250	4.71	33.90	248	26.78	130.1	4.62	5.19	1472.



OFFSHORE OCEANOGRAPHY GROUP

REFERENCE NO. 75- 1- 41

DATE 18/ 2/75

POSITION 49-10.0N, 132-40.0W GMT 11.5

RESULTS OF STP CAST 264 FCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.69	32.58	0	25.58	241.5	0.0	0.0	1475.
10	6.70	32.55	10	25.56	244.2	0.24	0.01	1475.
20	6.71	32.51	20	25.53	247.1	0.49	0.05	1475.
30	6.70	32.51	30	25.52	247.5	0.74	0.11	1475.
50	6.70	32.50	50	25.52	248.1	1.23	0.32	1475.
75	6.69	32.51	75	25.52	248.0	1.85	0.71	1476.
100	6.69	32.54	99	25.55	246.0	2.47	1.26	1476.
125	6.56	33.32	124	26.18	186.4	3.01	1.88	1477.
150	6.64	33.66	149	26.44	162.5	3.44	2.48	1478.
175	6.42	33.80	174	26.58	149.6	3.83	3.13	1478.
200	6.06	33.83	199	26.65	143.1	4.20	3.83	1477.
225	5.80	33.85	223	26.69	138.7	4.55	4.59	1476.
250	5.52	33.86	248	26.74	134.9	4.89	5.42	1476.
300	5.14	33.90	298	26.81	128.0	5.55	7.26	1475.
400	4.62	34.01	397	26.96	114.9	6.75	11.54	1475.
500	4.36	34.06	496	27.02	109.4	7.88	16.70	1475.
600	4.17	34.09	595	27.07	105.7	8.95	22.70	1476.
800	3.55	34.16	793	27.19	95.1	10.96	36.98	1477.
1000	3.31	34.22	991	27.26	89.5	12.80	53.90	1479.
1200	2.82	34.38	1188	27.43	73.6	14.44	72.25	1481.
1500	2.49	34.45	1484	27.52	66.1	16.53	100.92	1484.

BATHYTHERMOGRAPH OBSERVATIONS
(P-75-1)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all B.T.'s taken on Line P outbound and inbound, and one a day on Station P.

Although B.T.'s at Station P were taken every three hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes force the cancellation of a B.T., in that case an X.B.T. was taken. These X.B.T.'s are shown following the B.T.'s.

EXPLANATION OF HEADINGS

Example: 0030 / 13-04-74

48° 34' N.

125° 30' W.

0030 = Time in GMT

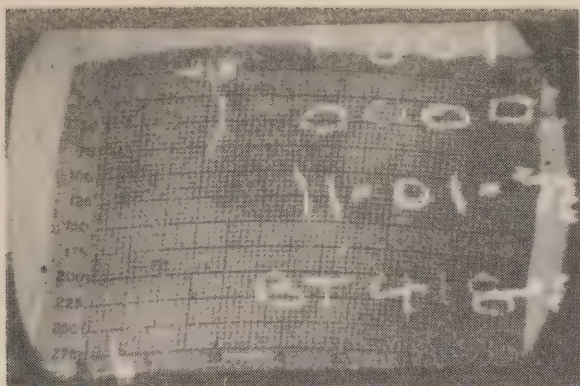
13 = Day

04 = Month

74 = Year

48° 34' N. = Latitude

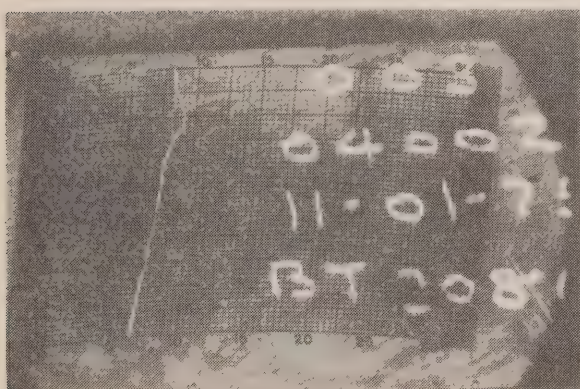
125° 30' W. = Longitude



0000/ 11-01-75
 48° 33' N.
 125° 33' W.



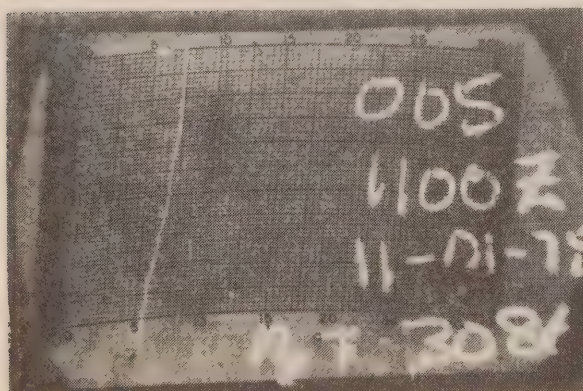
0130/ 11-01-75
 48° 38' N.
 126° 00' W.



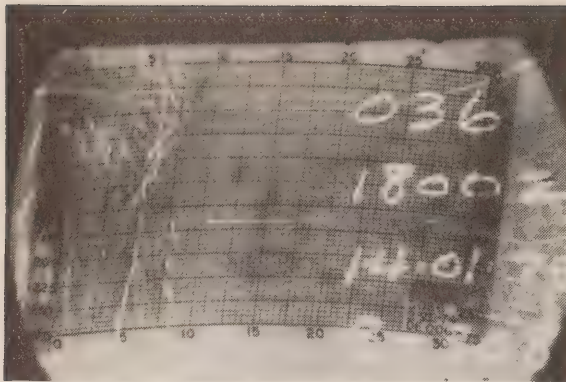
0400/ 11-01-75
 48° 42' N.
 126° 40' W.



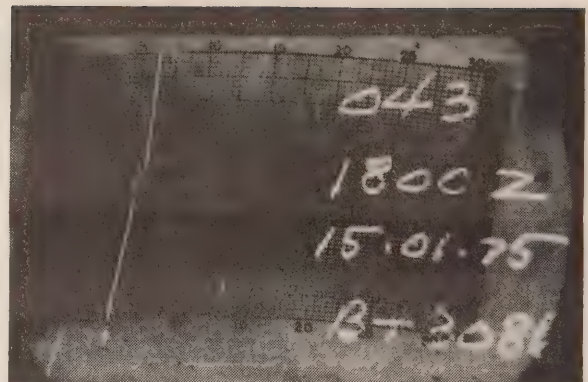
0725/ 11-01-75
 48° 46' N.
 127° 40' W.



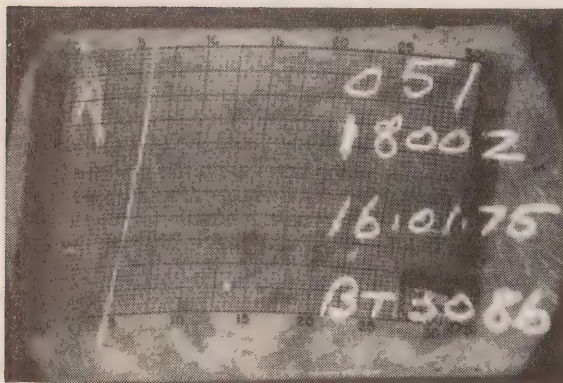
1100/ 11-01-75
 48° 51' N.
 128° 40' W.



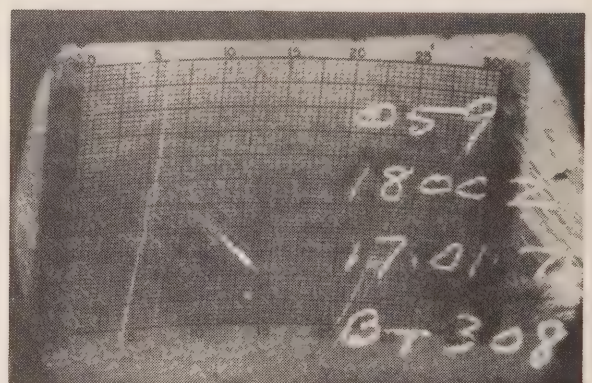
1800/ 14-01-75
 50° 00' N.
 145° 00' W.



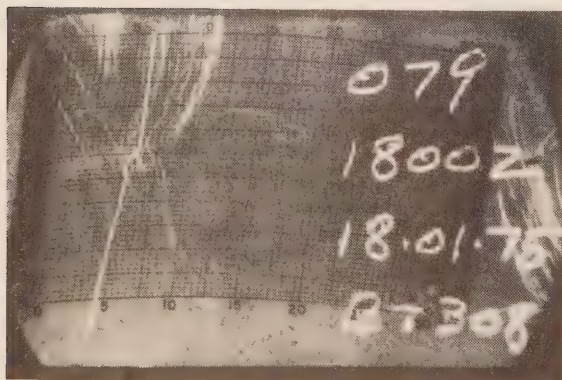
1800/ 15-01-75
 49° 50' N.
 144° 48' W.



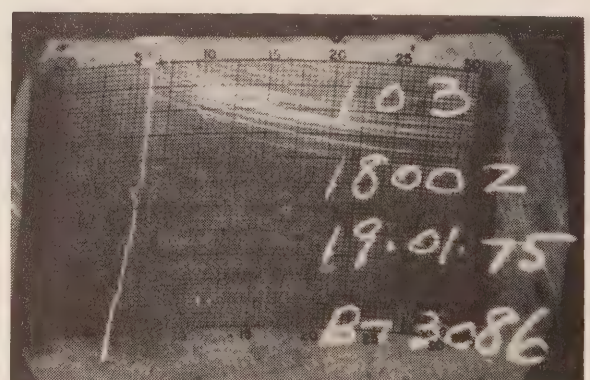
1800/ 16-01-75
 50° 00' N.
 144° 50' W.



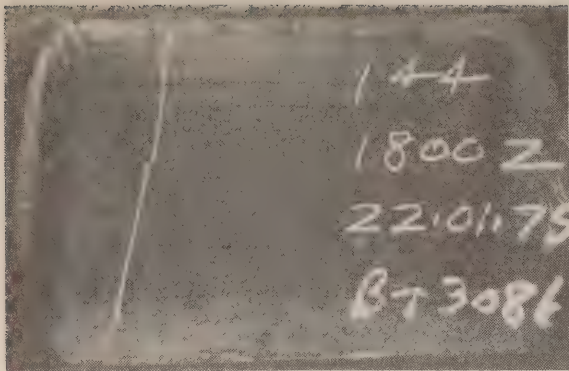
1800/ 17-01-75
 50° 02' N.
 144° 50' W.



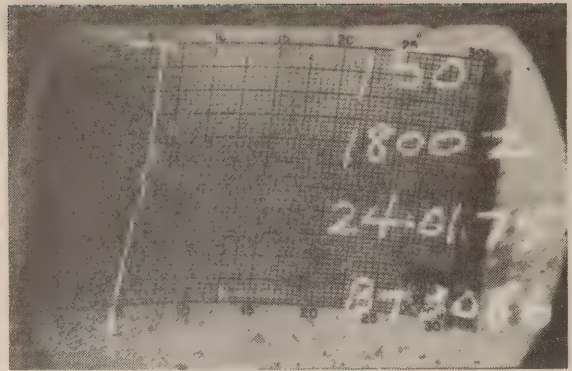
1800/ 18-01-75
 50° 00' N.
 144° 55' W.



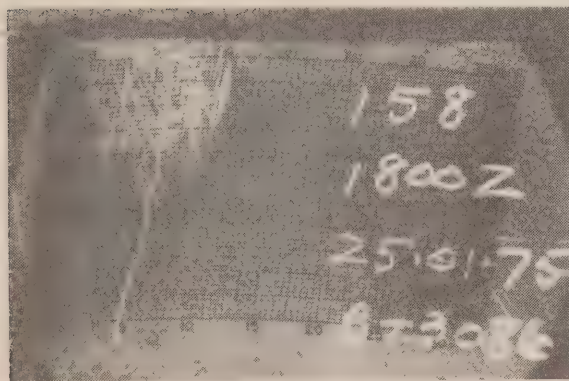
1800/ 19-01-75
 50° 00' N.
 145° 00' W.



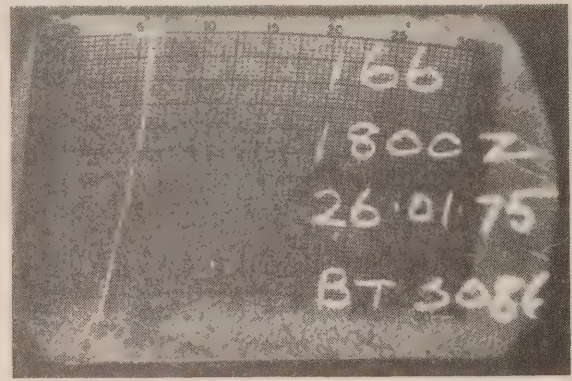
1800/ 22-01-75
50° 00' N.
144° 53' W.



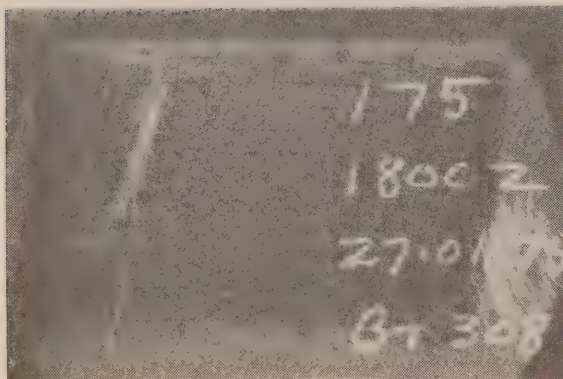
1800/ 24-01-75
50° 00' N.
145° 00' W.



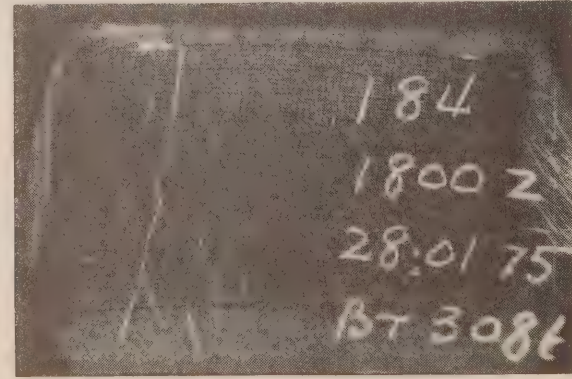
1800/ 25-01-75
49° 56' N.
144° 48' W.



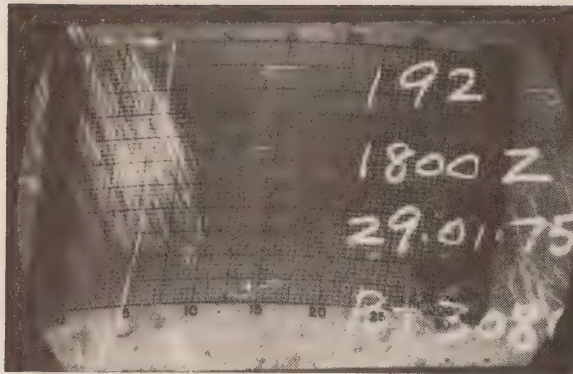
1800/ 26-01-75
50° 00' N.
145° 03' W.



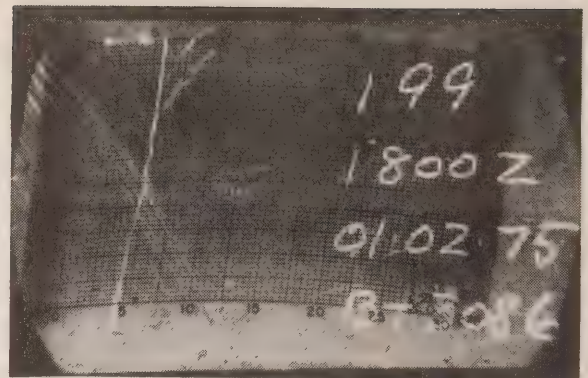
1800/ 27-01-75
49° 55' N.
144° 53' W.



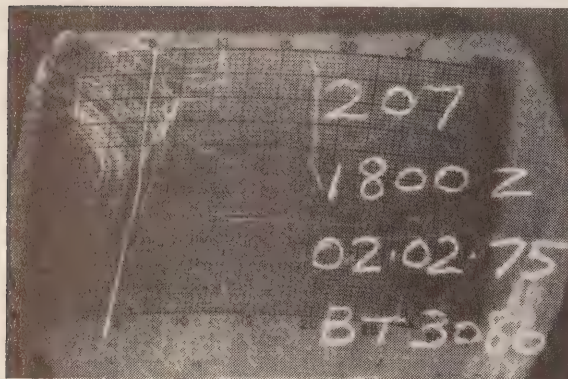
1800/ 28-01-75
50° 00' N.
145° 00' W.



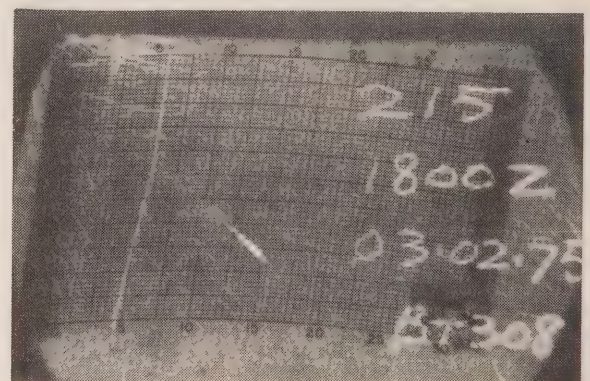
1800/ 29-01-75
50° 00' N.
145° 07' W.



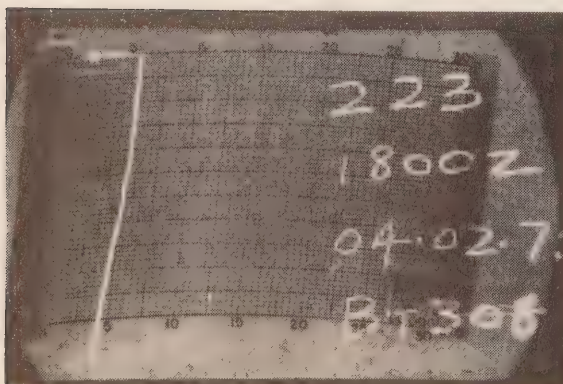
1800/ 01-02-75
50° 00' N.
145° 00' W.



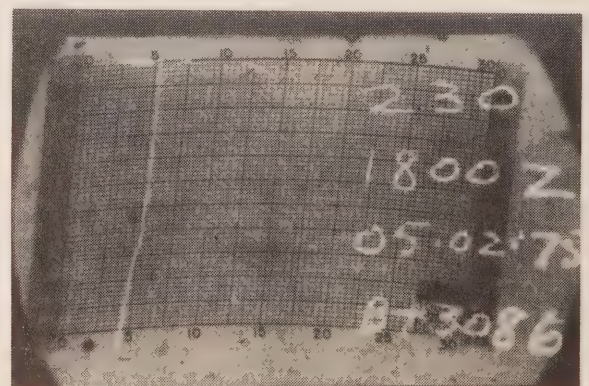
1800/ 02-02-75
50° 10' N.
145° 00' W.



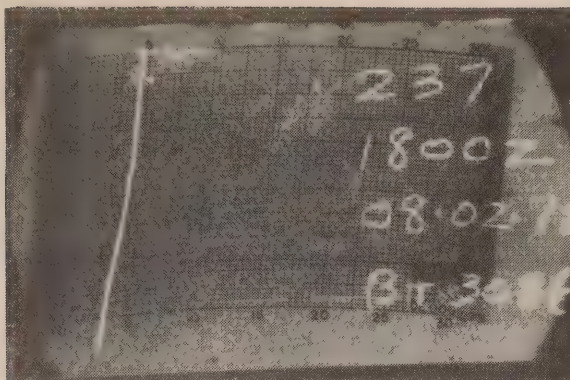
1800/ 03-02-75
50° 00' N.
145° 07' W.



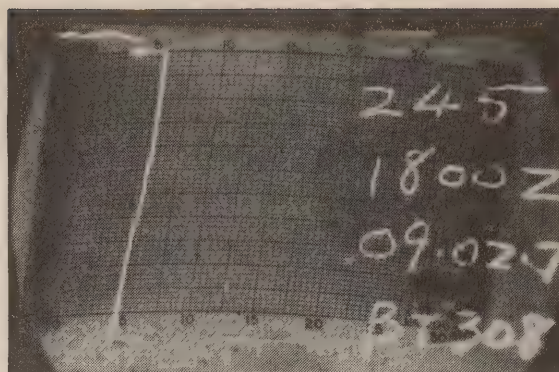
1800/ 04-02-75
50° 00' N.
145° 00' W.



1800/ 05-02-75
50° 00' N.
145° 00' W.



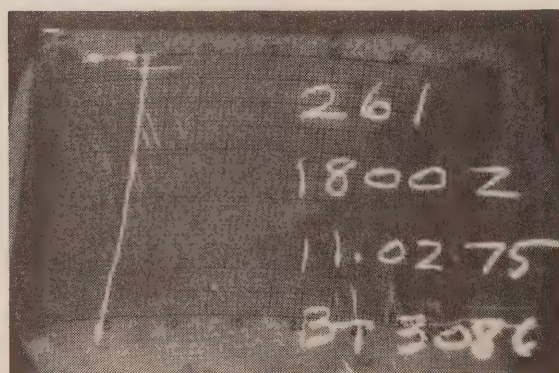
1800/ 08-02-75
 50° 00' N.
 144° 55' W.



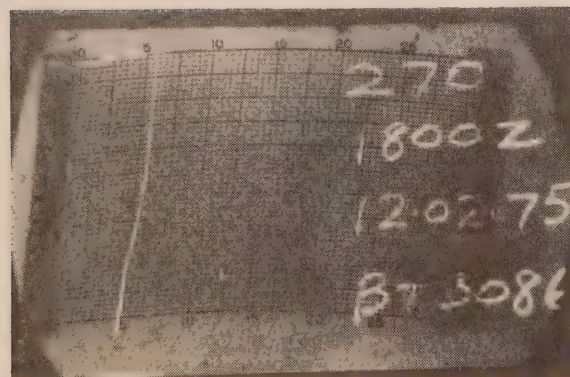
1800/ 09-02-75
 50° 05' N.
 145° 10' W.



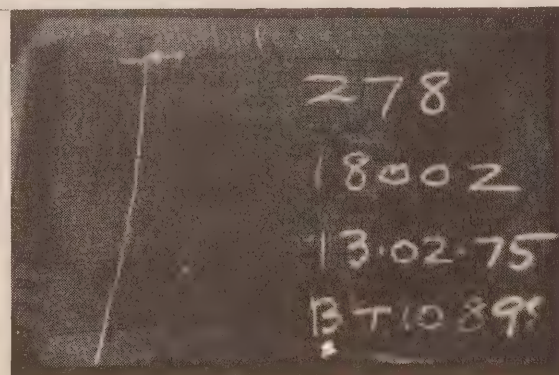
1800/ 10-02-75
 49° 56' N.
 145° 07' W.



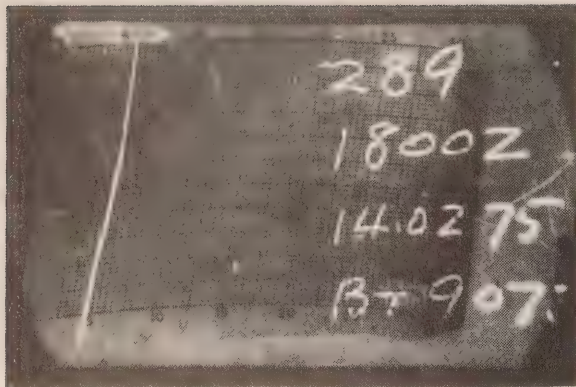
1800/ 11-02-75
 50° 05' N.
 145° 07' W.



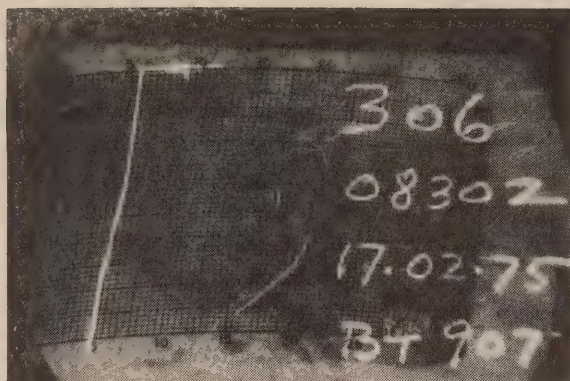
1800/ 12-02-75
 50° 04' N.
 145° 14' W.



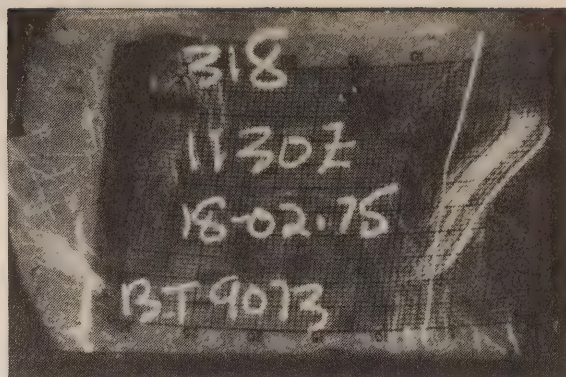
1800/ 13-02-75
 49° 54' N.
 145° 00' W.



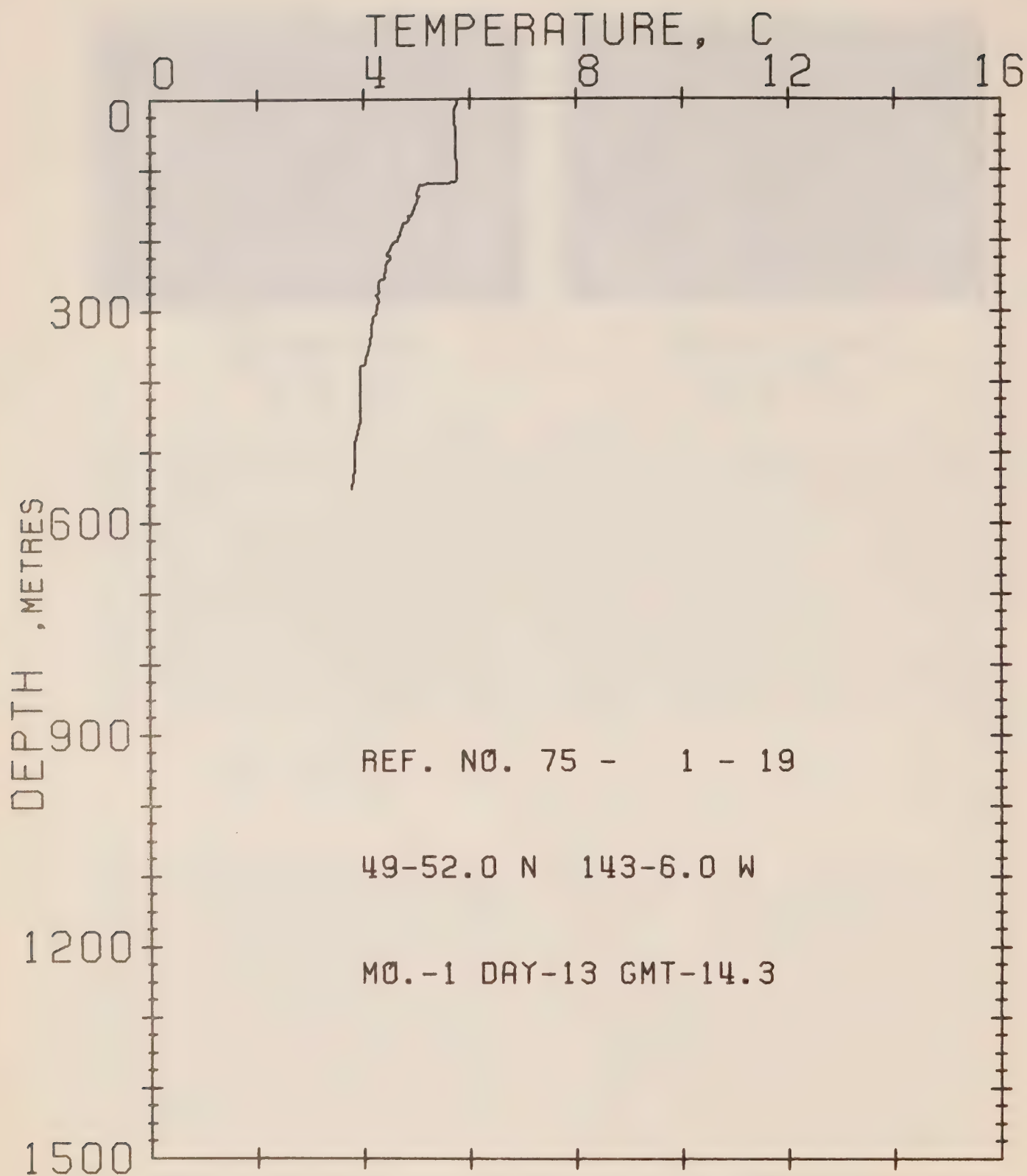
1800/ 14-02-75



0830/ 17-02-75
49° 49' N.
142° 40' W.



1130/ 18-02-75
49° 10' N.
132° 40' W.



OFFSHORE OCEANOGRAPHY

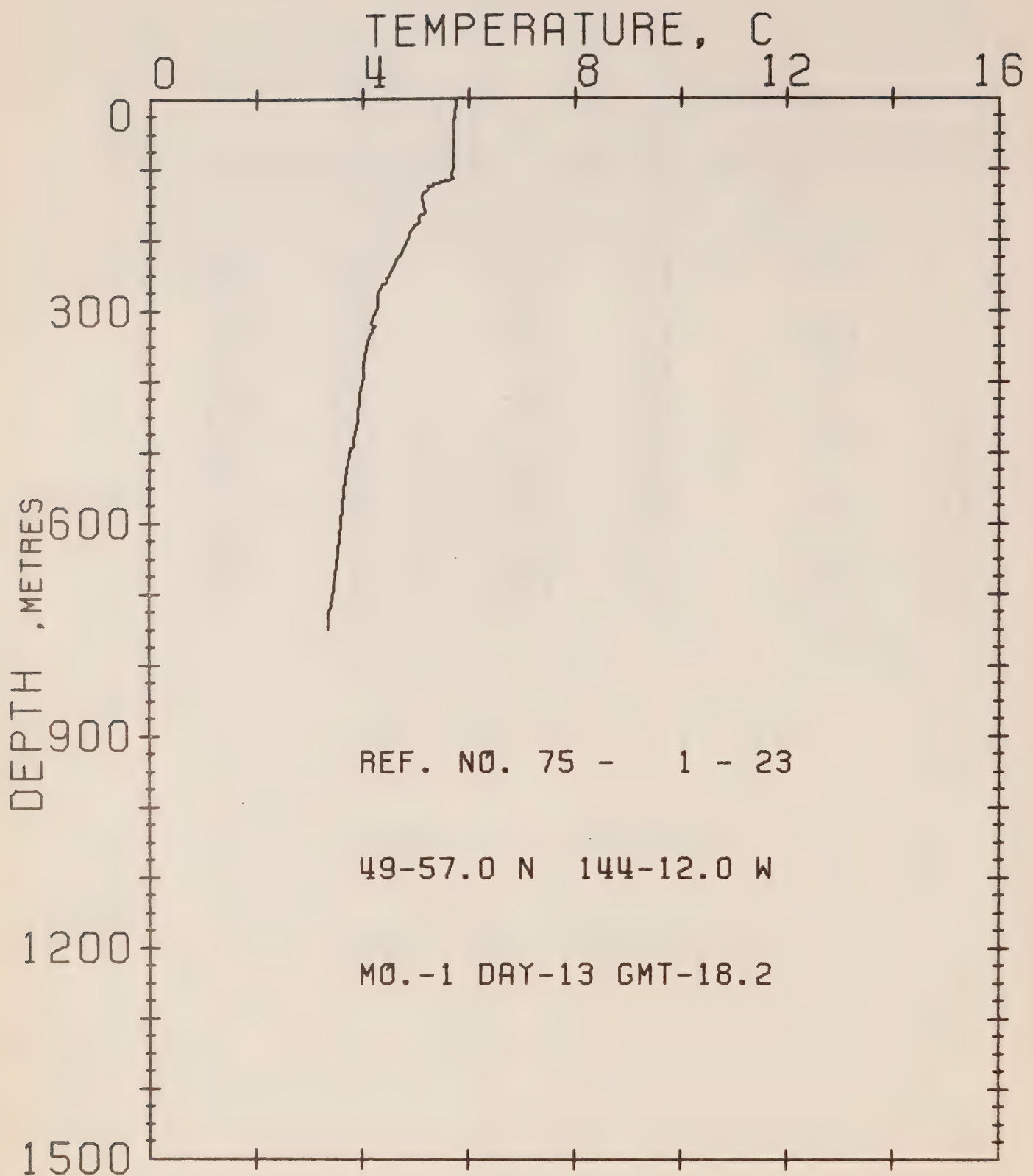
REFERENCE NO. 75- 1- 19

DATE 13/ 1/75

POSITION 49-52.0N 143-06.0W GMT 14.3

RESULTS OF XBT CAST 46 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	5.77	172	4.85	256	4.35
6	5.77	177	4.74	260	4.30
16	5.72	180	4.74	275	4.30
110	5.77	192	4.68	278	4.24
117	5.77	194	4.68	285	4.30
118	5.72	202	4.63	306	4.24
119	5.56	204	4.57	310	4.19
120	5.28	206	4.57	349	4.13
122	5.07	220	4.46	375	4.02
133	5.01	222	4.46	381	3.96
137	5.01	223	4.52	458	3.96
138	5.07	227	4.52	490	3.85
144	5.01	230	4.46	521	3.85
145	5.01	251	4.41	524	3.85
166	4.90	253	4.41	551	3.80
167	4.85				



OFFSHORE OCEANOGRAPHY

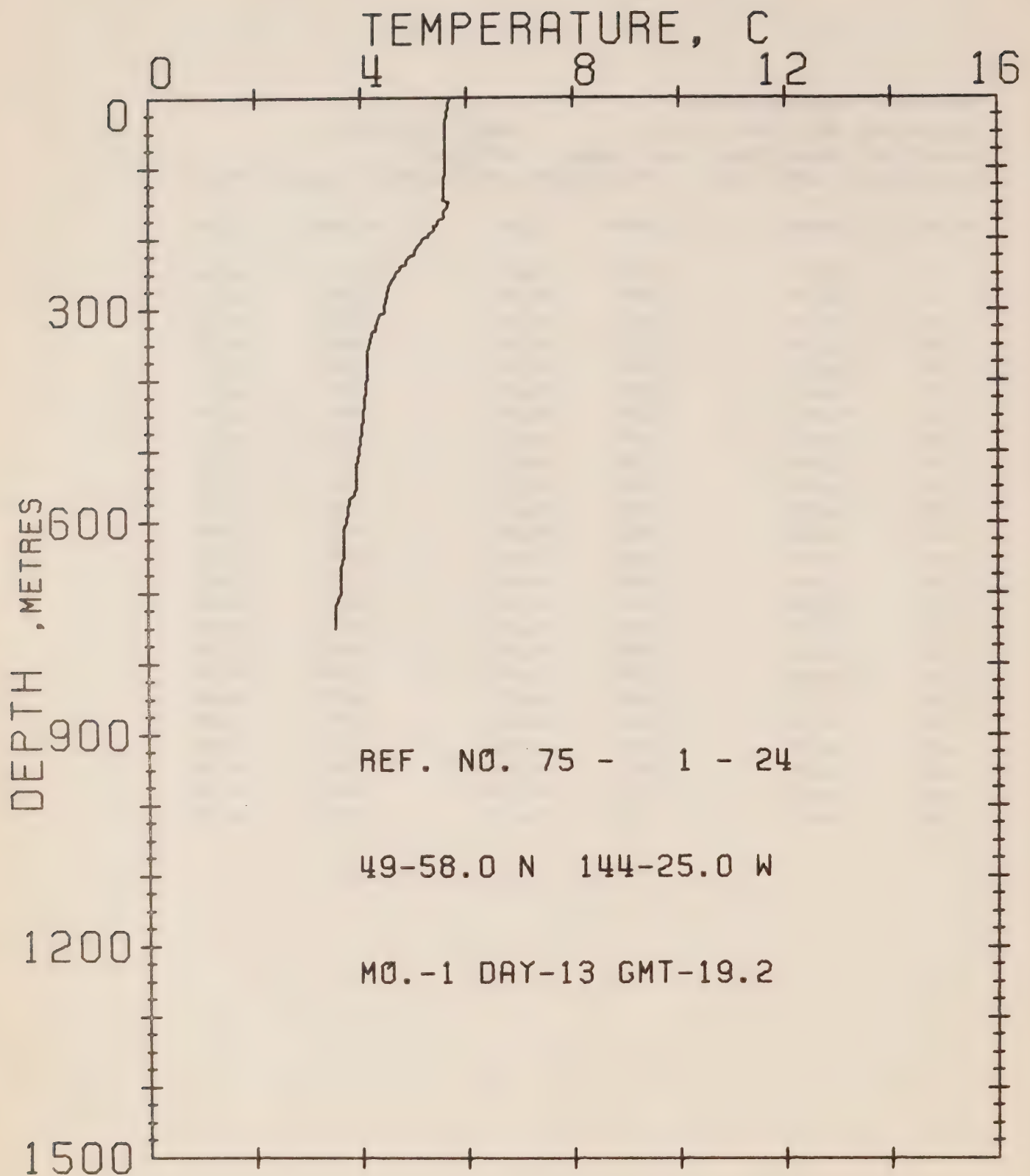
REFERENCE NO. 75- 1- 23

DATE 13/ 1/75

POSITION 49-57.0N 144-12.0W GMT 18.2

RESULTS OF XBT CAST 72 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.77	178	5.01	323	4.24
6	5.77	188	4.90	324	4.24
40	5.72	201	4.85	325	4.18
69	5.72	217	4.74	330	4.18
94	5.72	221	4.74	333	4.18
113	5.67	222	4.68	335	4.13
114	5.72	224	4.68	354	4.07
115	5.61	227	4.63	375	4.02
116	5.56	228	4.63	396	4.02
118	5.50	230	4.63	418	3.96
120	5.39	251	4.52	455	3.91
121	5.34	252	4.52	483	3.85
123	5.34	254	4.46	491	3.85
124	5.23	259	4.46	493	3.80
127	5.23	261	4.41	537	3.68
129	5.23	262	4.41	578	3.63
131	5.18	271	4.35	622	3.57
137	5.12	278	4.30	659	3.52
141	5.12	291	4.30	687	3.46
160	5.18	299	4.30	691	3.46
162	5.18	307	4.24	718	3.41
164	5.12	313	4.18	728	3.35
165	5.07	320	4.18	743	3.35
175	5.07	321	4.18	749	3.35



OFFSHORE OCEANOGRAPHY

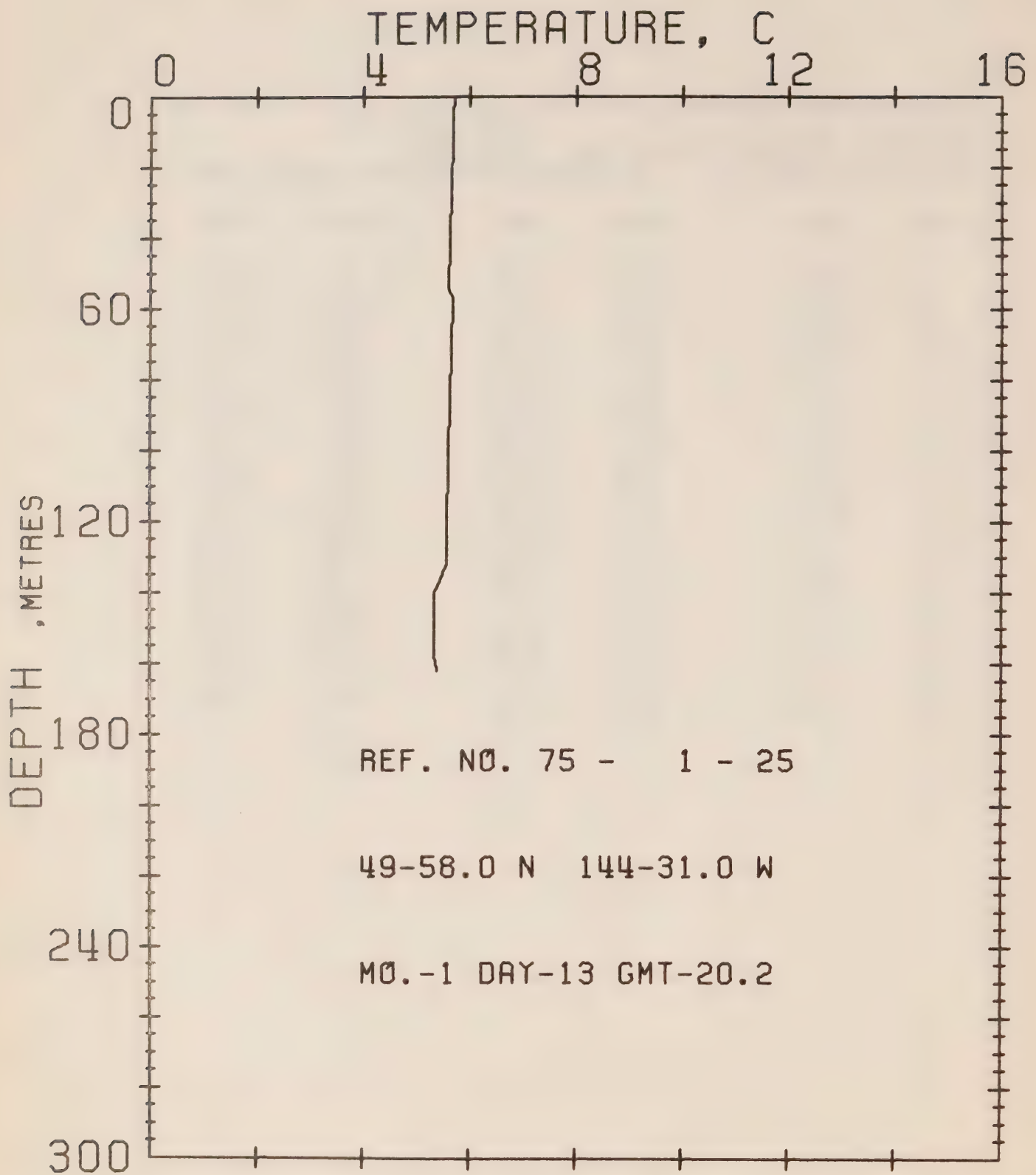
REFERENCE NO. 75- 1- 24

DATE 13/ 1/75

POSITION 49-58.0N 144-25.0W GMT 19.2

RESULTS OF XBT CAST 59 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	5.67	211	5.07	331	4.24
37	5.61	222	5.01	360	4.13
99	5.61	226	4.90	392	4.13
127	5.56	235	4.85	429	4.07
131	5.56	240	4.74	472	4.02
146	5.56	243	4.74	513	3.96
147	5.61	246	4.68	522	3.91
149	5.67	257	4.63	524	3.91
160	5.61	265	4.57	554	3.91
163	5.56	280	4.52	563	3.85
170	5.56	281	4.52	567	3.80
173	5.50	283	4.52	602	3.74
179	5.45	297	4.46	610	3.68
181	5.45	305	4.46	650	3.68
182	5.39	307	4.41	665	3.63
188	5.39	310	4.35	700	3.63
191	5.34	311	4.35	720	3.52
196	5.28	313	4.35	747	3.52
197	5.28	324	4.30	749	3.52
198	5.23	330	4.30		



OFFSHORE OCEANOGRAPHY

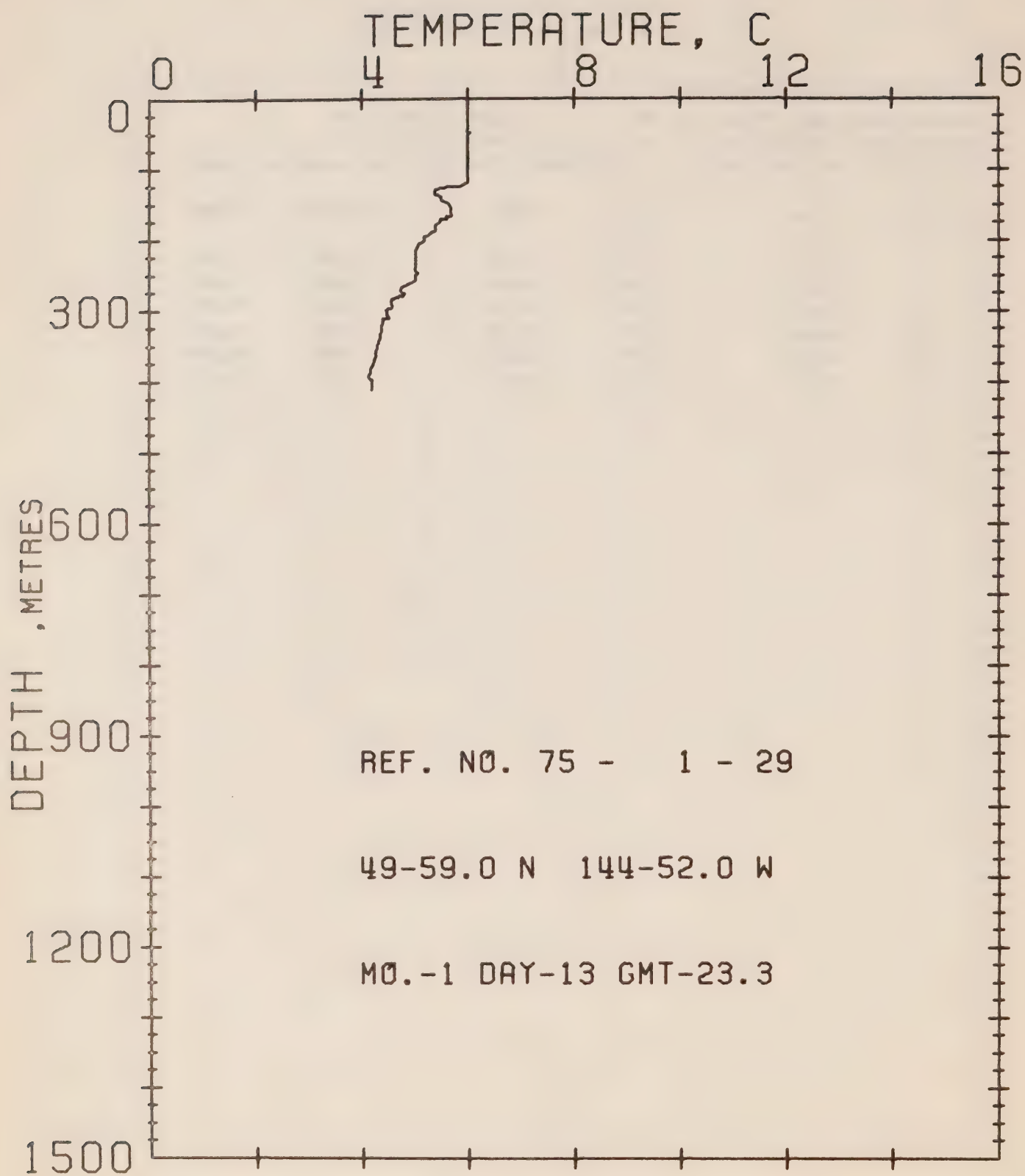
REFERENCE NO. 75- 1- 25

DATE 13/ 1/75

POSITION 49-58.0N 144-31.0W GMT 20.2

RESULTS OF XBT CAST 18 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	5.72	124	5.56	139	5.39
5	5.67	125	5.56	140	5.34
12	5.67	128	5.56	153	5.34
55	5.61	132	5.56	154	5.34
57	5.67	135	5.50	158	5.34
101	5.61	137	5.45	162	5.39



OFFSHORE OCEANOGRAPHY

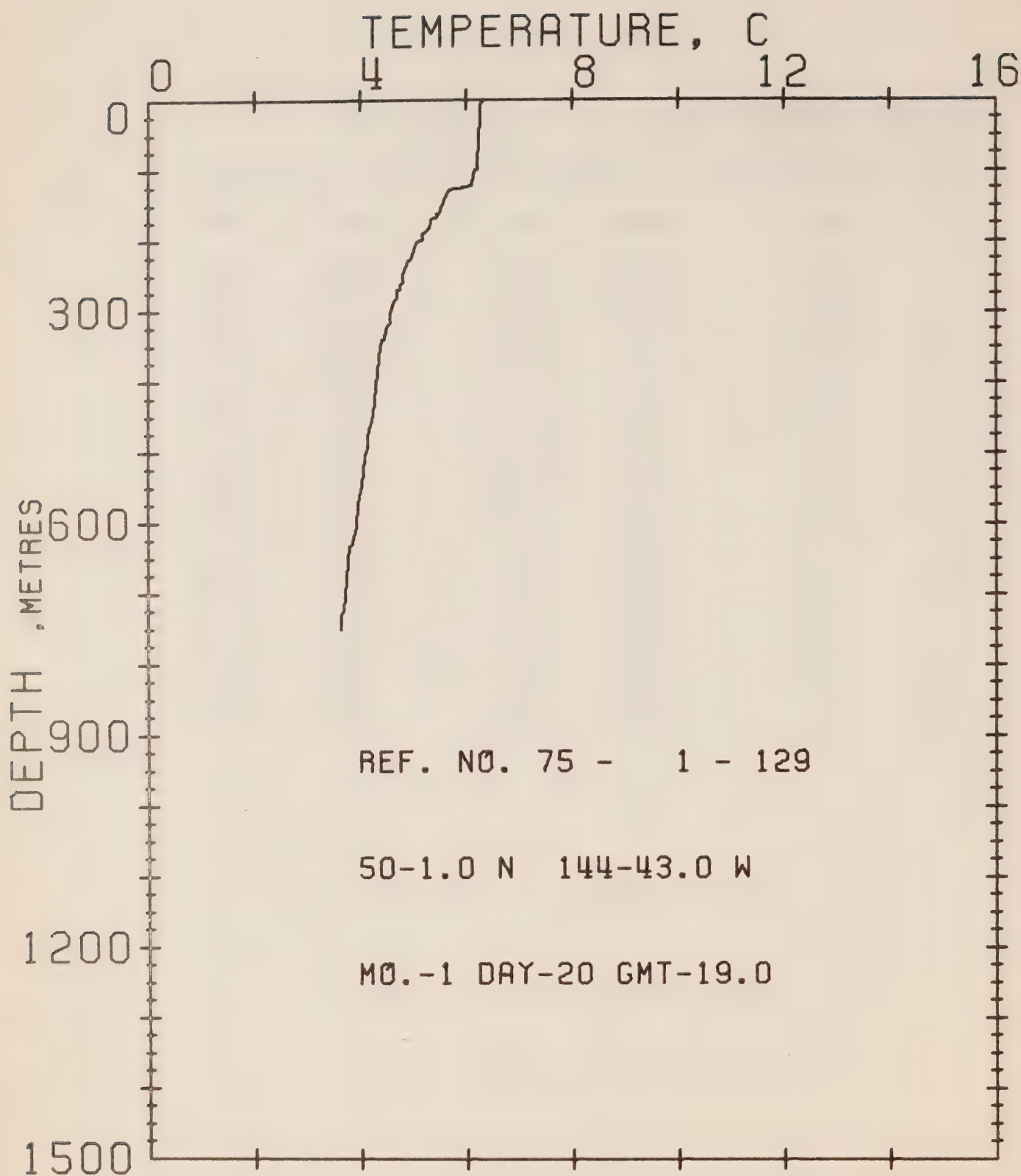
REFERENCE NO. 75- 1- 29

DATE 13/ 1/75

POSITION 49-59.0N 144-52.0W GMT 23.3

RESULTS OF XBT CAST 62 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	5.99	166	5.67	265	4.79
5	5.99	167	5.61	266	4.74
47	5.99	170	5.61	273	4.74
48	6.05	171	5.50	274	4.79
49	5.99	175	5.45	276	4.79
53	5.99	179	5.39	278	4.74
118	5.99	185	5.39	281	4.63
121	5.94	187	5.34	284	4.57
123	5.83	195	5.18	293	4.57
124	5.67	200	5.18	298	4.46
126	5.50	207	5.07	309	4.52
128	5.39	216	5.01	310	4.41
133	5.39	226	5.01	312	4.41
135	5.45	239	5.01	337	4.35
138	5.50	243	5.01	350	4.30
140	5.50	245	5.07	373	4.24
141	5.50	248	5.01	378	4.18
146	5.61	254	5.01	394	4.13
155	5.67	256	5.01	397	4.18
158	5.67	260	4.90	409	4.18
159	5.67	263	4.85		



OFFSHORE OCEANOGRAPHY

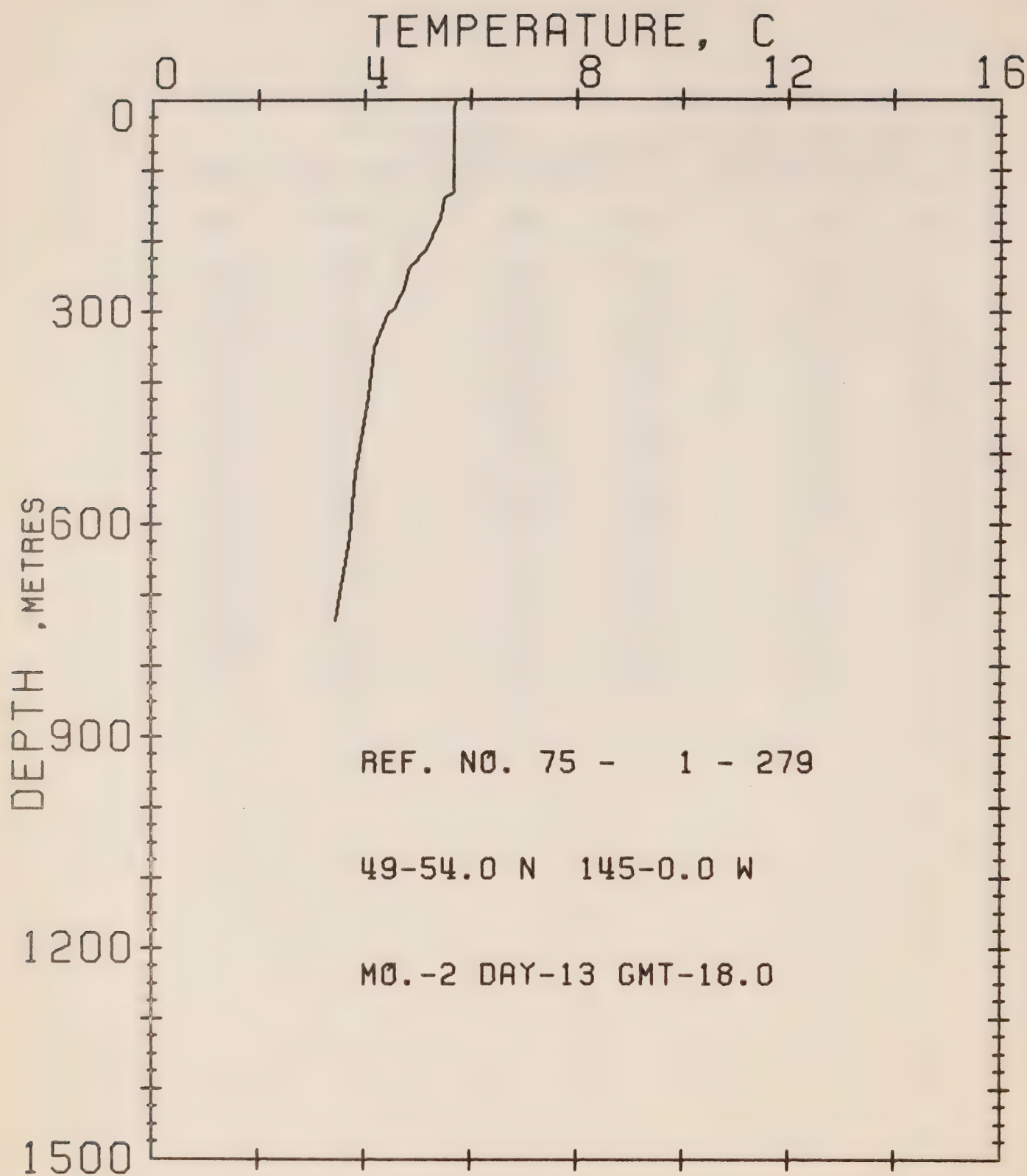
REFERENCE NO. 75- 1-129

DATE 20/ 1/75

POSITION 50-01.0N 144-43.0W GMT 19.0

RESULTS OF XBT CAST 56 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	6.32	197	5.18	366	4.35
9	6.26	201	5.07	407	4.30
16	6.26	226	4.96	448	4.24
23	6.26	228	4.90	475	4.13
91	6.21	250	4.79	493	4.13
99	6.21	260	4.79	505	4.07
100	6.15	265	4.74	507	4.07
120	6.10	269	4.74	546	4.02
122	6.10	271	4.68	574	3.96
128	5.67	283	4.68	605	3.91
146	5.56	285	4.63	630	3.85
162	5.50	305	4.57	632	3.80
163	5.45	309	4.57	679	3.74
167	5.45	310	4.57	723	3.68
169	5.34	318	4.57	731	3.63
177	5.34	319	4.52	733	3.63
183	5.28	338	4.46	747	3.63
187	5.23	340	4.46	749	3.63
190	5.18	341	4.41		



OFFSHORE OCEANOGRAPHY

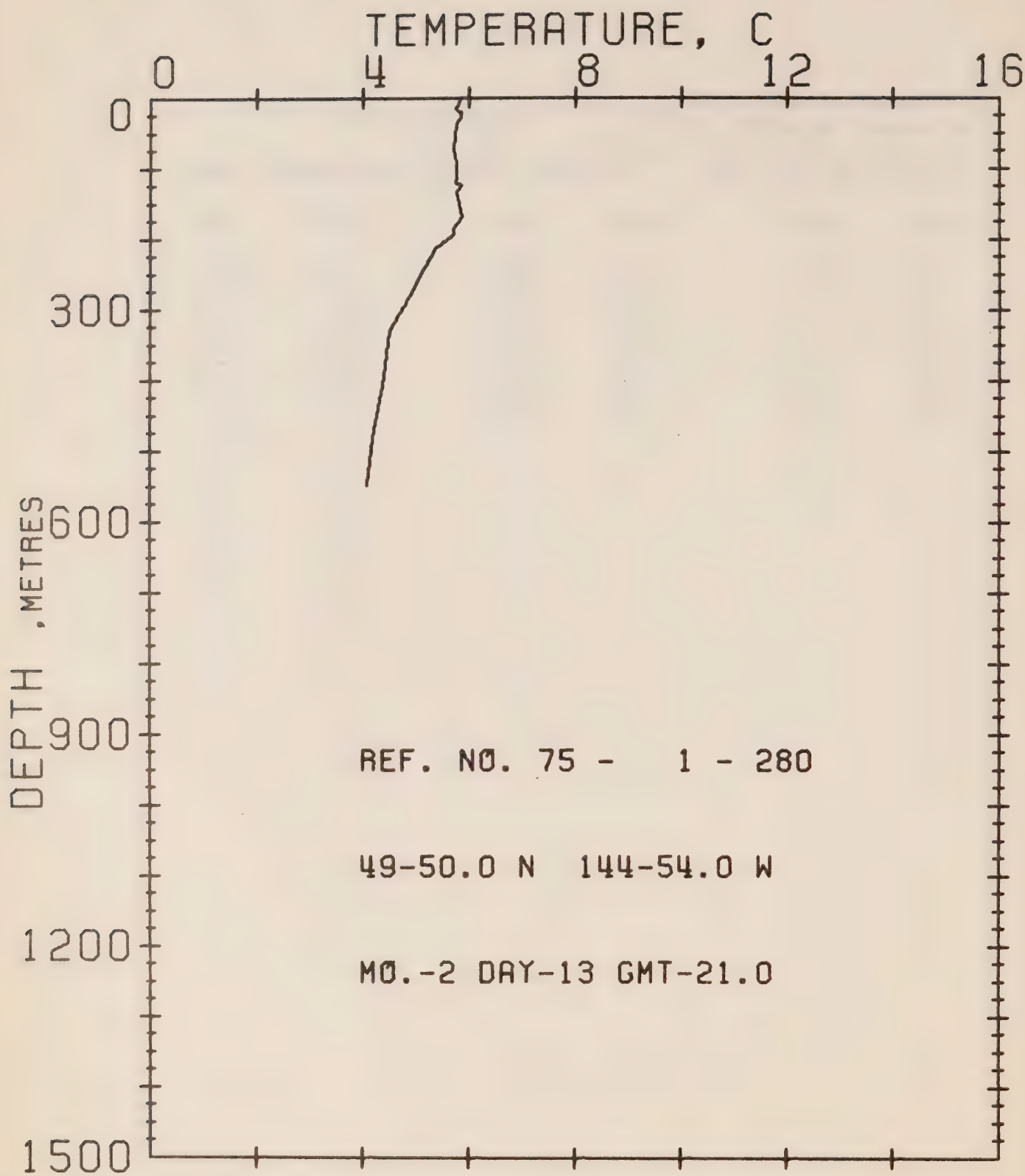
REFERENCE NO. 75- 1-279

DATE 13/ 2/75

POSITION 49-54.0N 145-00.0W GMT 18.0

RESULTS OF XBT CAST 20 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.72	142	5.50	302	4.46
15	5.67	168	5.45	351	4.18
47	5.67	194	5.28	421	4.07
86	5.67	212	5.18	528	3.85
121	5.67	237	4.85	619	3.74
131	5.67	269	4.74	736	3.46
135	5.56	297	4.57		



OFFSHORE OCEANOGRAPHY

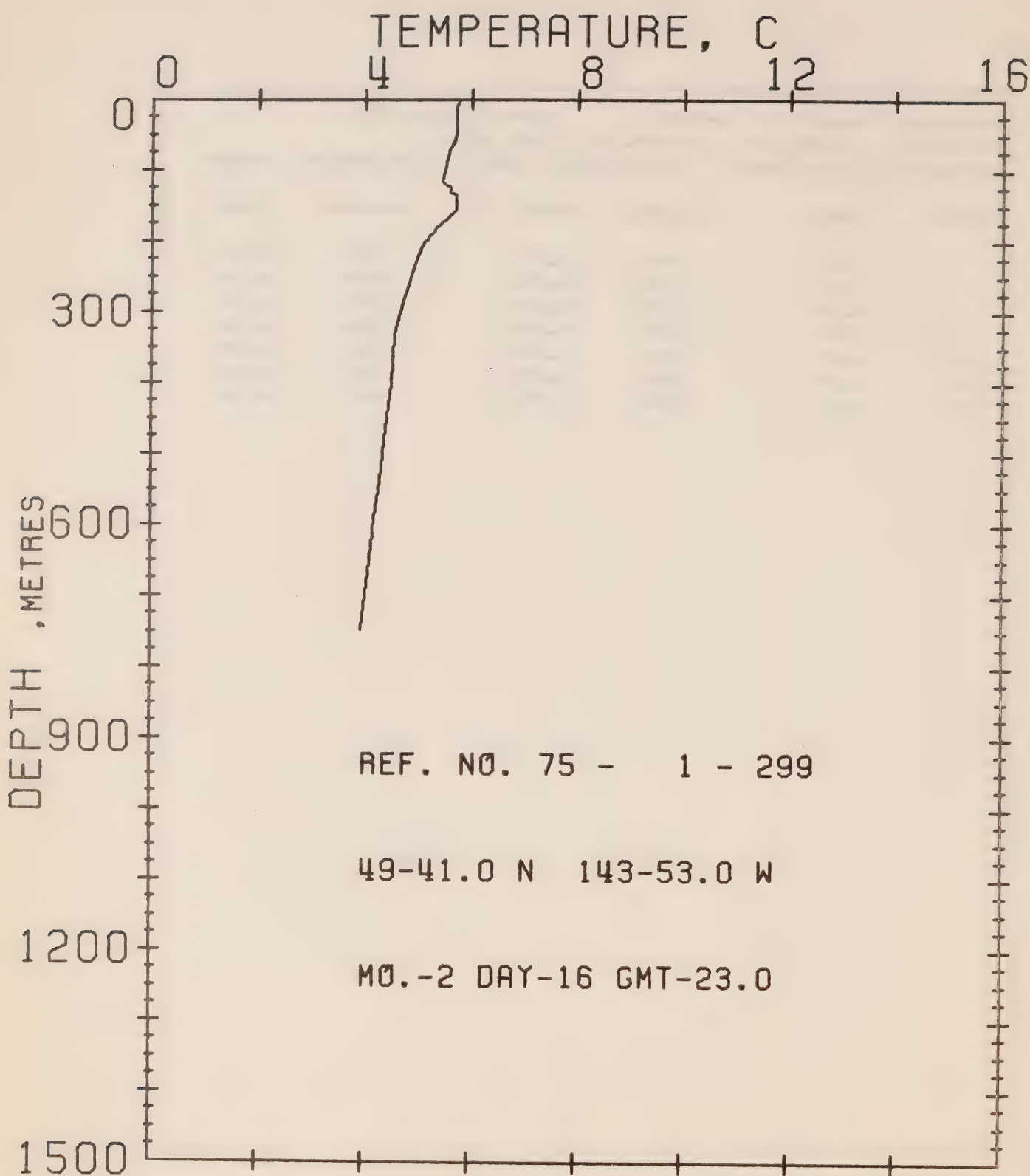
REFERENCE NO. 75- 1-280

DATE 13/ 2/75

POSITION 49-50.0N 144-54.0W GMT 21.0

RESULTS OF XBT CAST 21 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.83	93	5.77	213	5.39
17	5.77	119	5.77	240	5.18
22	5.88	123	5.88	272	4.96
24	5.83	134	5.77	330	4.52
29	5.83	171	5.88	397	4.41
37	5.77	186	5.72	481	4.18
73	5.72	194	5.72	547	4.07



OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 1-299

DATE 16/ 2/75

POSITION 49-41.0N 143-53.0W GMT 23.0

RESULTS OF XBT CAST 25 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.77	133	5.72	281	4.74
10	5.72	145	5.72	333	4.57
47	5.72	156	5.72	402	4.52
58	5.67	167	5.56	463	4.41
74	5.56	178	5.39	537	4.30
102	5.50	192	5.23	592	4.18
116	5.45	208	5.07	667	4.07
123	5.61	231	4.96	748	3.96
129	5.61				

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
(P-75-1)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 1

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
75	1	10	2342	30.929	7.9	125-33
75	1	11	115	30.994	7.8	126- 0
75	1	11	337	31.547	8.2	126-40
75	1	11	719	32.437	8.6	127-40
75	1	11	1101	32.492	7.3	128-40
75	1	11	1612	32.498	7.9	129-40
75	1	11	1915	32.552	8.3	130-40
75	1	11	2226	32.519	8.3	131-40
75	1	12	112	32.503		132-40
75	1	12	400	32.419		133-40
75	1	14	0	32.656	6.2	ON STATION
75	1	15	0	32.659	6.1	ON STATION
75	1	16	0	32.642	6.2	ON STATION
75	1	17	0	32.657	5.9	ON STATION
75	1	18	0	32.665	6.0	ON STATION
75	1	19	0	32.661	6.0	ON STATION
75	1	20	0	32.649	6.2	ON STATION
75	1	21	0	32.661	6.2	ON STATION
75	1	22	0	32.646	6.2	ON STATION
75	1	23	0	32.651	6.2	ON STATION
75	1	24	0	32.640	6.3	ON STATION
75	1	25	0	32.643	6.1	ON STATION
75	1	26	0	32.650	6.1	ON STATION
75	1	27	0	32.654	6.1	ON STATION
75	1	28	0	32.654	6.1	ON STATION
75	1	29	0	32.647	6.1	ON STATION
75	1	30	0	32.657	6.2	ON STATION
75	1	31	0	32.654	5.8	ON STATION
75	2	1	0	32.670	6.2	ON STATION
75	2	2	0	32.673	5.9	ON STATION
75	2	3	0	32.678	5.3	ON STATION
75	2	4	0	32.678	5.8	ON STATION
75	2	5	0	32.666	5.6	ON STATION
75	2	6	0	32.677	5.7	ON STATION
75	2	7	0	32.674	5.9	ON STATION
75	2	8	0	32.682	5.8	ON STATION
75	2	9	0	32.678	5.8	ON STATION
75	2	10	0	32.686	5.6	ON STATION
75	2	11	0	32.684	5.8	ON STATION
75	2	12	0	32.694	5.7	ON STATION
75	2	13	0	32.694	5.8	ON STATION
75	2	14	0	32.686	5.6	ON STATION
75	2	15	0	32.690	5.7	ON STATION
75	2	16	0	32.700	5.7	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 1

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
75	2	17	0	32.699	5.5	143-40
75	2	17	800	32.673	5.7	142-40
75	2	17	1240	32.659		141-40
75	2	17	1500	32.635	5.8	140-40
75	2	17	1715	32.640	6.0	139-40
75	2	17	2010	32.629		138-40
75	2	17	2240	32.580		137-40
75	2	18	110	32.573		136-40
75	2	18	350	32.473		135-40
75	2	18	615	32.476		134-40
75	2	18	850	32.611	7.1	133-40
75	2	18	1130	32.483	6.8	132-40
75	2	18	1455	32.545	7.2	131-40
75	2	18	1810	32.595	7.4	130-40
75	2	18	2125	32.503	7.3	129-40
75	2	19	100	32.439		128-40
75	2	19	500	32.442	7.7	127-40
75	2	19	905	32.264	8.2	126-40
75	2	19	1130	31.257	8.0	126- 0
75	2	19	1300	31.704	8.2	125-33

CAI EF 321

- 76R02

Pacific Marine Science Report 76-2

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Publications

*Canada Marine Sciences Directorate
Pacific Region*

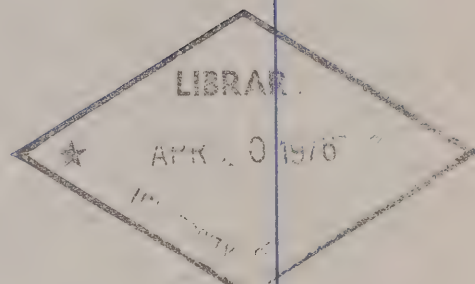
**OCEANOGRAPHIC OBSERVATIONS
AT OCEAN STATION P
(50° N, 145° W)**

VOLUME 65

14 February – 2 April 1975

by

C. de Jong



**INSTITUTE OF OCEAN SCIENCES, PATRICIA BAY
Victoria, B.C.**

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January, 1976

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ABSTRACT

Physical, chemical and biological oceanographic observations are made from the weathership at Ocean Weather Station Papa, and between Esquimalt and Station Papa, on a routine continuing basis. Physical oceanography data only are shown, including profiles obtained with bottle casts, conductivity-temperature-pressure instruments, and mechanical and expendable bathythermographs. Surface observations are also shown.

INTRODUCTION

Canadian operation of Ocean Weather Station P (Latitude 50°00'N, Longitude 145°00'W) was inaugurated in December 1950. The station is occupied primarily to make meteorological observations of the surface and upper air and to provide an air-sea rescue service. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the *CCGS VANCOUVER* and the *CCGS QUADRA*. Each ship remains on station for a period of six weeks, and is then relieved by the alternate ship, thus maintaining a continuous watch.

Bathythermograph observations have been made at Station P since July 1952. A program of more extensive oceanographic observations commenced in August 1956. This was extended in April 1959 by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections, in addition to being made on Line P oceanographic stations, are also made at odd meridians at 40', i.e. 139°40'W, 141°40'W, etc. These stations are known as Line P BT stations. Data observed prior to 1968 has been indexed by Collins *et al.* (1969).

The present record includes hydrographic, bathythermograph and continuously sampled STP data collected from the *CCGS QUADRA* during the period 14 February to 2 April 1975.

All physical oceanographic data have been stored by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), Biological Station, Nanaimo, British Columbia, Canada. Requests for these data should be directed to FRB.

Marine geochemical data are for the Ocean Chemistry Group, Ocean and Aquatic Sciences, Environment Canada, 512 - 1230 Government Street, Victoria, British Columbia, Canada.

PROGRAM OF OBSERVATIONS FROM CCGS QUADRA, 14 FEBRUARY - 2 APRIL 1975
(CODC REF. NO. 15-75-002)

Oceanographic observations were made by Mr. C. de Jong, Ocean and Aquatic Sciences, Environment Canada.

En route to Station P, Line P stations 1-4 were occupied and an STP profile made to near bottom or 1500 metres. All other stations were missed due to adverse weather conditions.

Salinity, nitrate, alkalinity and total CO₂ samples were taken from the seawater loop at all Line P stations. The thermosalinograph and the surface temperature recorder were run continuously.

Mechanical BT or XBT's were taken at all Line P and BT stations.

At Station P the oceanographic program was carried out as follows:

I. Physical Oceanography

- 1) Profiles of salinity, temperature and oxygen were obtained from 6 hydrographic stations.
- 2) 14 STP profiles to 1200 metres and 17 to 300 metres were obtained.
- 3) BT's were taken every three hours to coincide with meteorological observations, encoded and transmitted according to the IGOSS format.
- 4) Salinity samples daily at 0000 hrs GMT from the seawater loop.

II. Marine Geochemistry

- 1) Samples for nutrients, tritium, alkalinity and total CO₂ were obtained from 6 depths to 500 metres. Nutrient, phosphate and salinity samples were also collected daily at 0000 hrs GMT and once every hour for a 24 hour period from the seawater loop.
- 2) Alkalinity and total CO₂ samples every 3 days from the seawater loop.
- 3) Air CO₂ samples weekly in quadruplicate.
- 4) 2 seawater C-14 samples were extracted from the seawater loop.

III. Biological and Productivity

Samples were obtained as follows:

- 1) 8 - 150 metre vertical plankton hauls.
 38 - micro and nano organism samples filtered from the seawater loop.
- 2) Samples for plant pigment, nitrate and C₁₄ productivity were obtained

from 1 station to 75 metres.

- 3) Approximately 120 salmon were caught.

En route from Station P only Line P station 12 was occupied and an STP profile made to 1200 metres. All other stations were cancelled due to a severe fuel shortage. Salinity, nitrate, nutrient, alkalinity and total CO₂ samples were taken from the seawater loop at all Line P stations.

The thermosalinograph and the surface temperature recorder were run continuously.

Mechanical or XBT's were taken at all Line P and BT stations.

IV. Observations for Other Agencies

- 1) Marine mammal observations were made by the ship's officers for Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C., Canada.
- 2) Bird observations were made by the ship's officers for Dr. M. Myres, University of Alberta, Calgary, Alberta, Canada.
- 3) Seawater samples were obtained for the Department of Chemistry, University of Washington, Seattle, U.S.A. 9 casts were made with a 15 gallon "Beer keg sampler" to 300 metres. 5 samples were treated in CO₂ outgasser. 4 samples were preserved in kegs.

Data was processed for publication by Messrs. C. de Jong, B. Minkley and E. Luscombe.

OBSERVATIONAL PROCEDURES

Temperatures at depth were measured by deep-sea-reversing thermometers of Richter and Wiese and/or Yoshino Keiki Co. manufacture. Two protected thermometers were used on all Niskin bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be $\pm 0.02^{\circ}\text{C}$.

Surface water temperatures were measured from a bucket sample using a deck thermometer of $\pm 0.1^{\circ}\text{C}$ accuracy.

Salinity determinations were made aboard ship with either an Auto-lab Model 601 Mark III inductive salinometer or a Hytech Model 6220 lab salinometer. Accuracy using duplicate determinations is estimated to be ± 0.003 ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of ± 5 m for depths less than 1000 m, and $\pm 0.5\%$ of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Line P engine intake continuous temperatures were recorded by a Honeywell Elektronik 15 Recorder. The temperature probe is at a depth of approximately 3 metres below the sea surface and the instrument accuracy is believed to be $\pm 0.1^{\circ}\text{C}$.

Each ship is equipped with a Plessey Model 6600-T thermosalinograph which is used, on Line P, for continuous recording of surface temperatures and salinities from the ship's seawater loop. The temperature probe is mounted at the seawater loop intake (approximately 3 metres below the surface) and the salinity probe and recorder are situated in the dry lab. The accuracy of this instrument is believed to be $\pm 0.1^{\circ}\text{C}$ for temperature and ± 0.1 ppt for salinity.

STP profiles were taken with a Guildline Model 8700 STP system.

COMPUTATIONS

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 565 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity, and dissolved oxygen vs $10g_{10}$ depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Data values which we suspect but which we have included in this data record are indicated with a plus. These data have been removed from punch card and magnetic tape records.

Analog records from the salinity-temperature-pressure instrument have been machine digitized, then replotted using the Calcomp plotter.

Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (degrees Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in metres
SIGMA-T	is specific gravity anomaly

SVA is specific volume anomaly
 THETA is potential temperature (degrees Celsius)
 SVA (THETA) is potential specific volume anomaly
 DELTA D is geopotential anomaly (J/kg)
 POT EN is potential energy in units of 10^8 ergs/cm²
 OXY is the concentration of dissolved oxygen expressed in millilitres per litre
 B-V PERIOD is the Brunt-Vaisala period in minutes.

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- Collins, C.A., R.L. Tripe, D.A. Healey and J. Joergensen, 1969. The time distribution of serial oceanographic data from the Ocean Station P programme. *Fish. Res. Bd. Can. Tech. Rept.* No. 106.
- Reiniger, R.F. and C.K. Ross, 1968. A method of interpolation with application to oceanographic data. *Deep Sea Res.* 15: 185-193.
- U.S.N. Hydrographic Office, 1955. Instruction Manual for oceanographic observations, Publ. No. 607.

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- Figure 5. Salinity difference between hydro data and STP. P-75-2
- Figure 6. Temperature difference between hydro data and STP. P-75-2

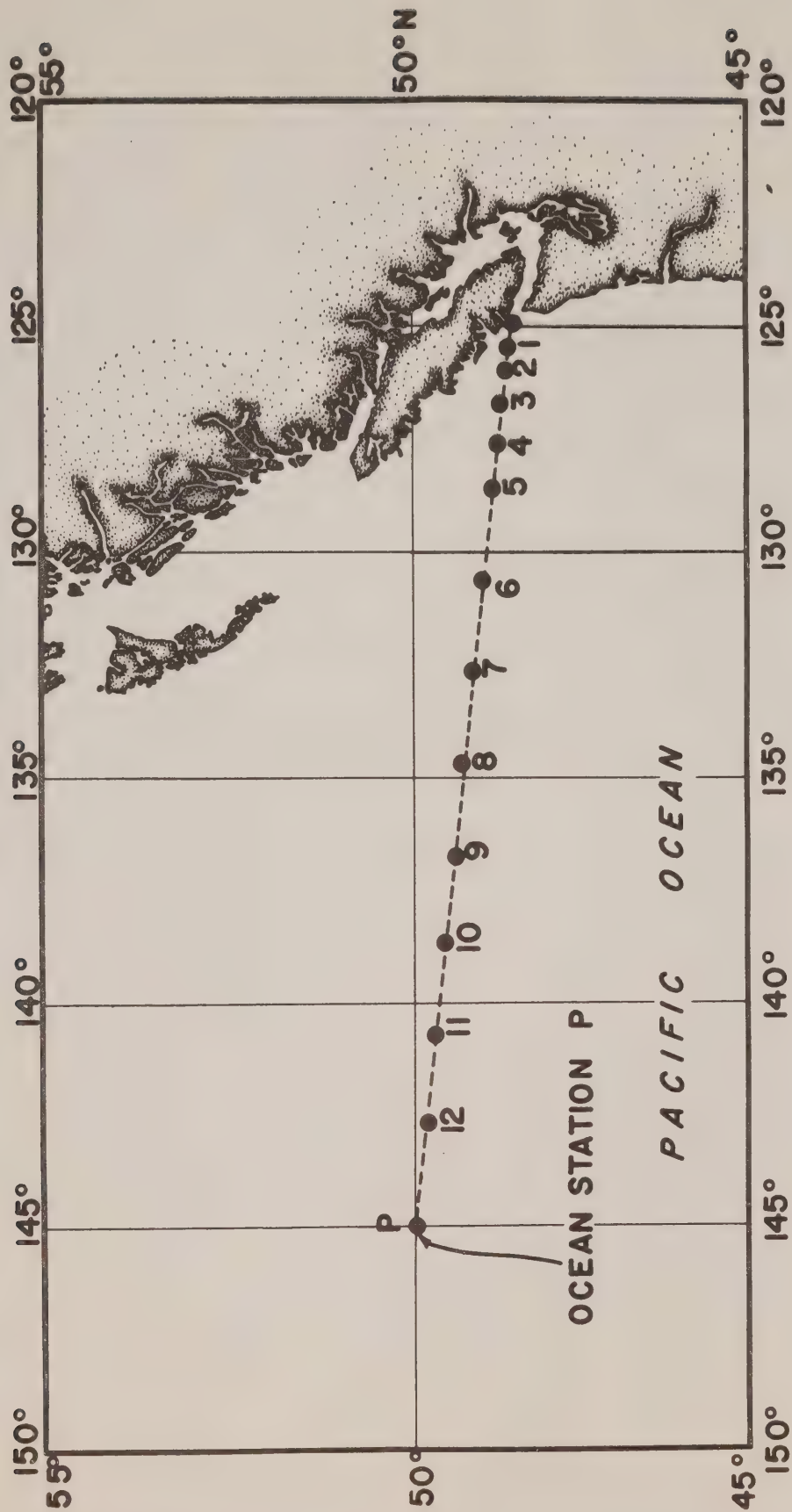


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-75-2⁸
(CODC REFERENCE NO. 15-75-002)

RESULTS OF HYDROGRAPHIC OBSERVATIONS
(P-75-2)

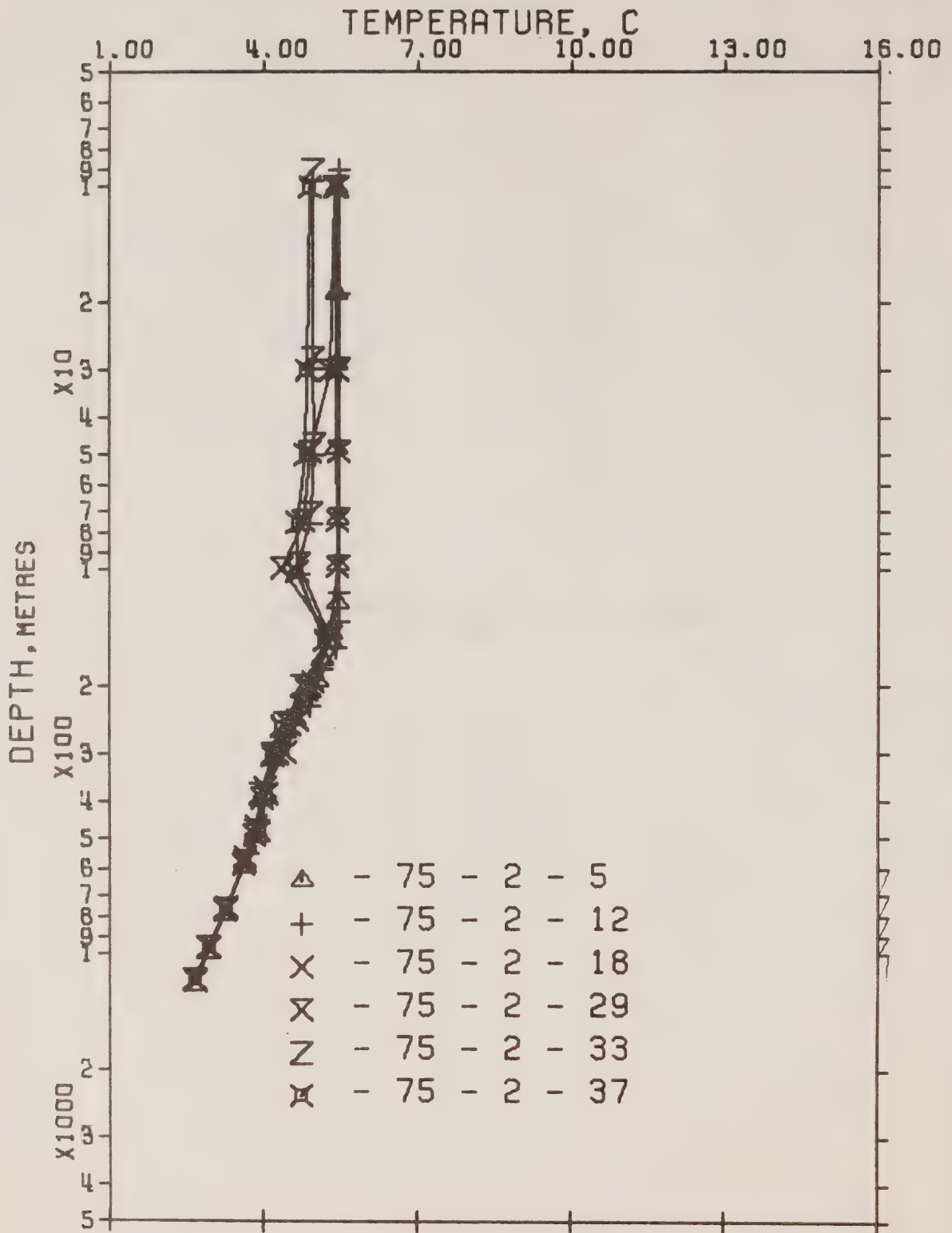


Figure 2. Composite plot of temperature vs \log_{10} depth. P-75-2

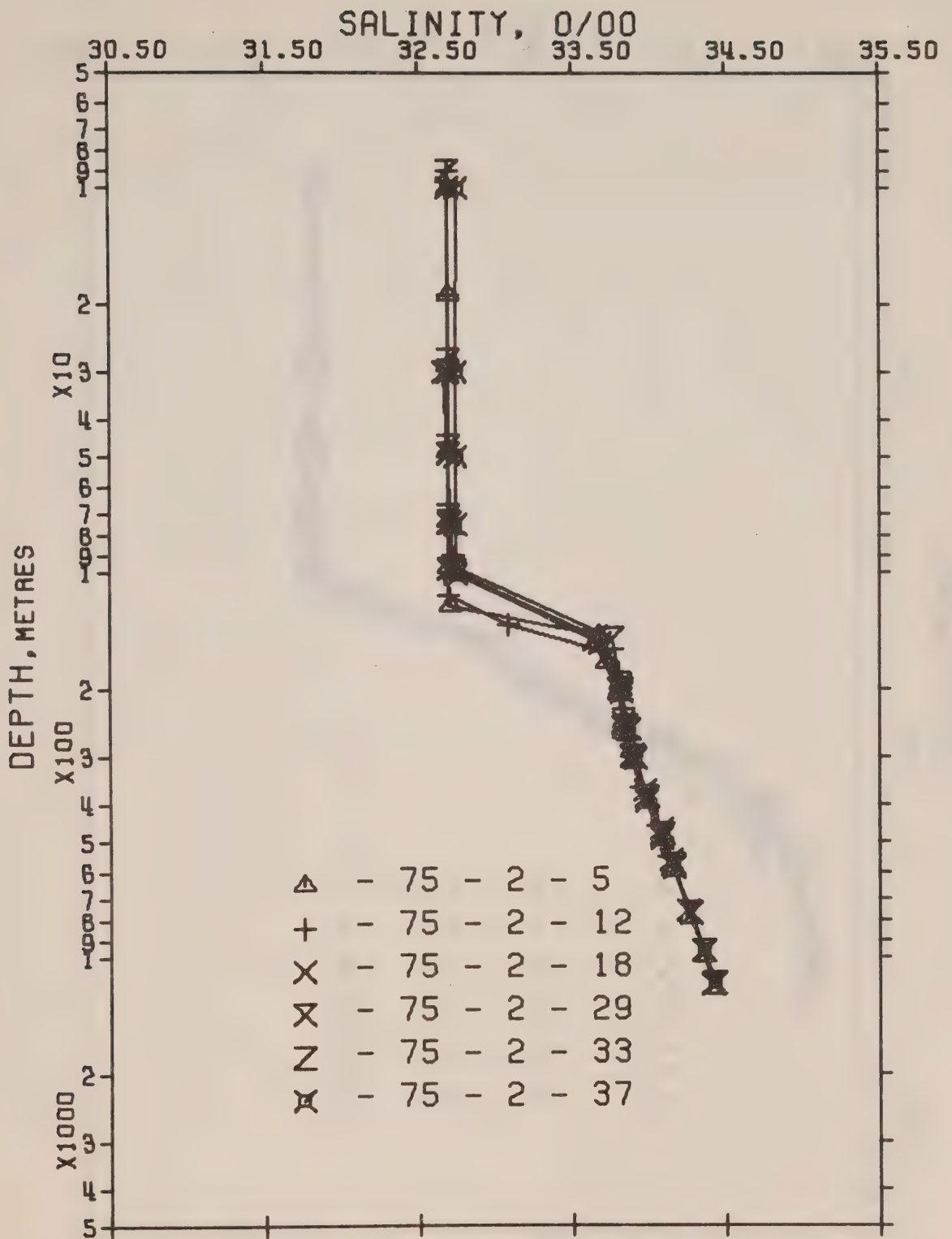


Figure 3. Composite plot of salinity vs \log_{10} depth. P-75-2

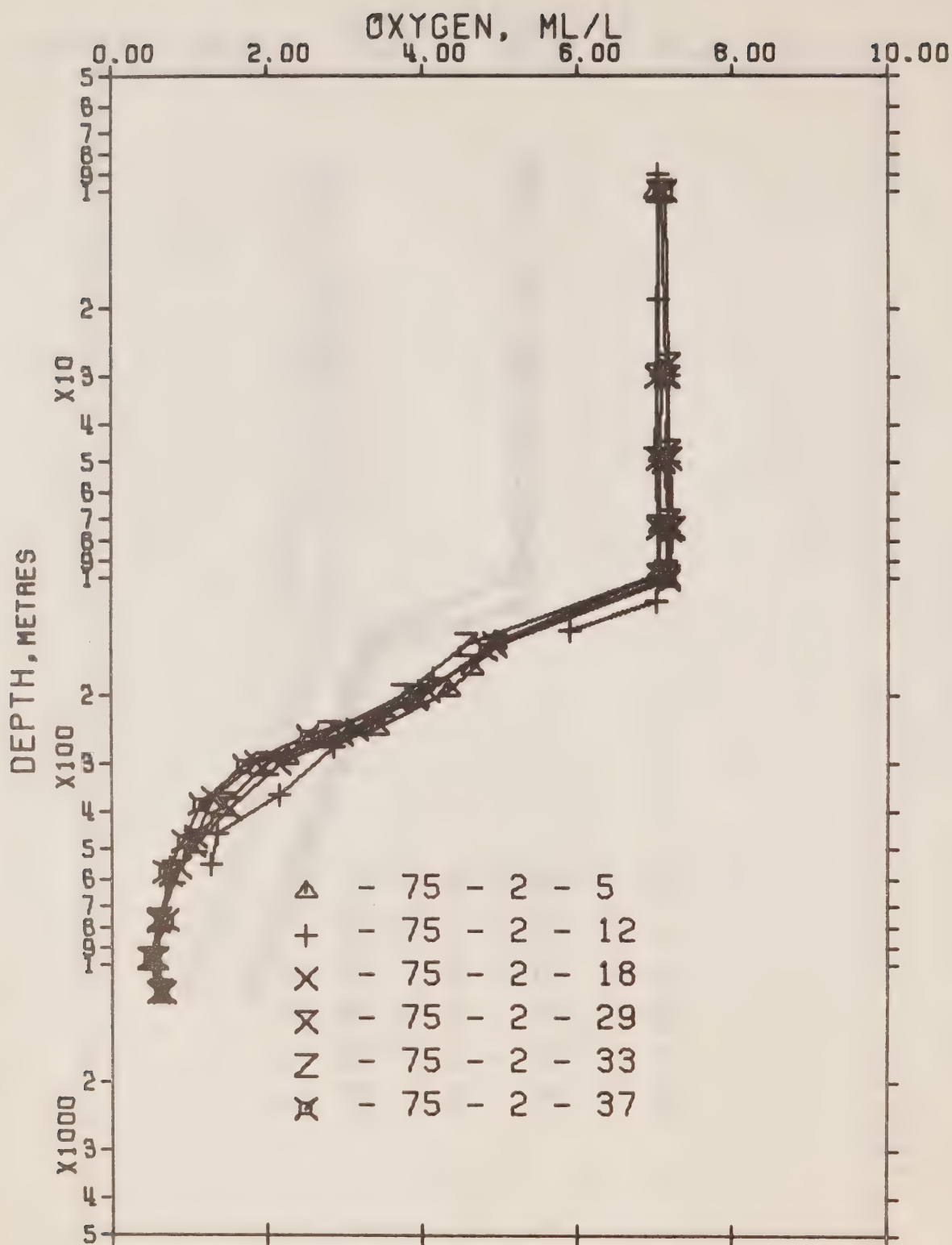
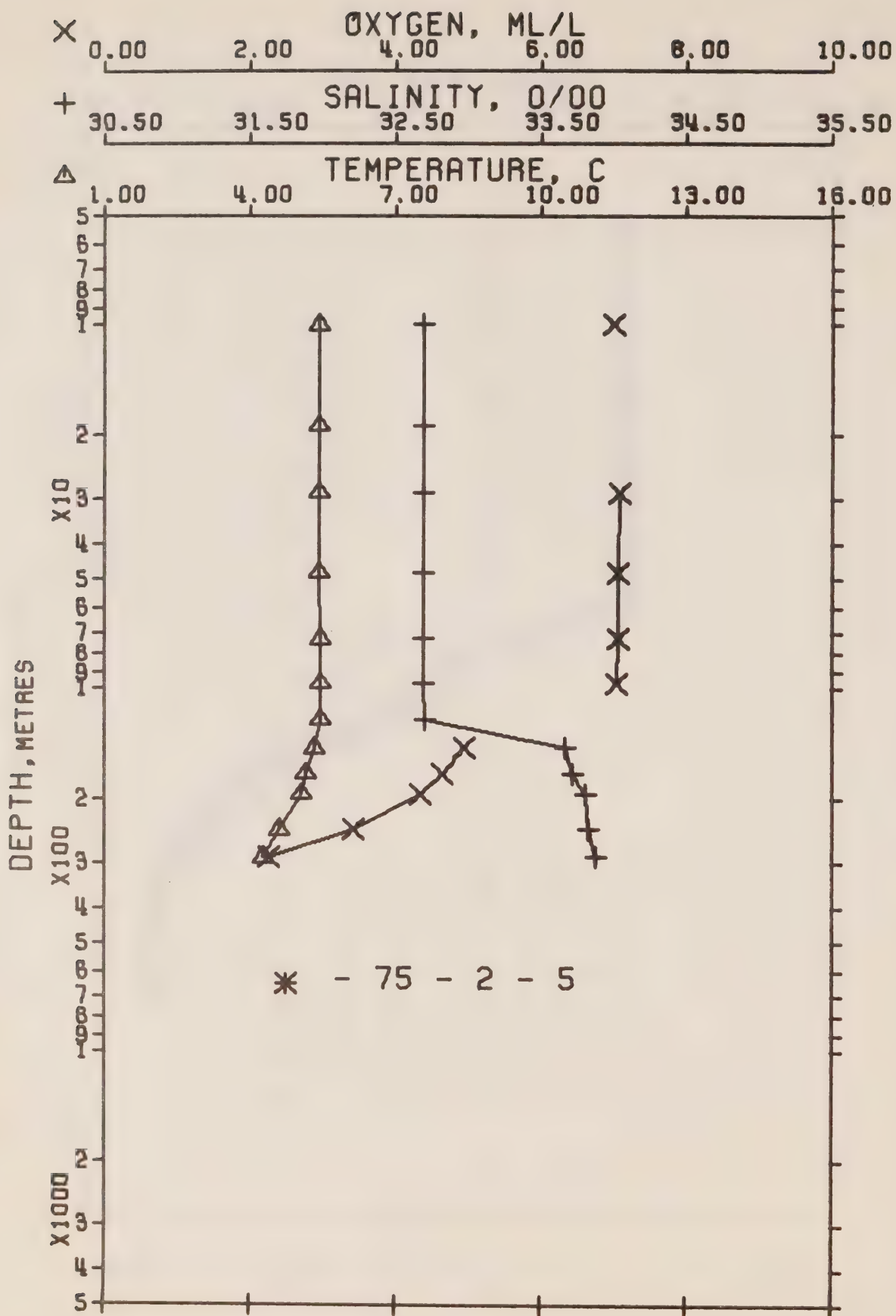


Figure 4. Composite plot of oxygen vs \log_{10} depth. P-75-2



DATE 21/ 2/75

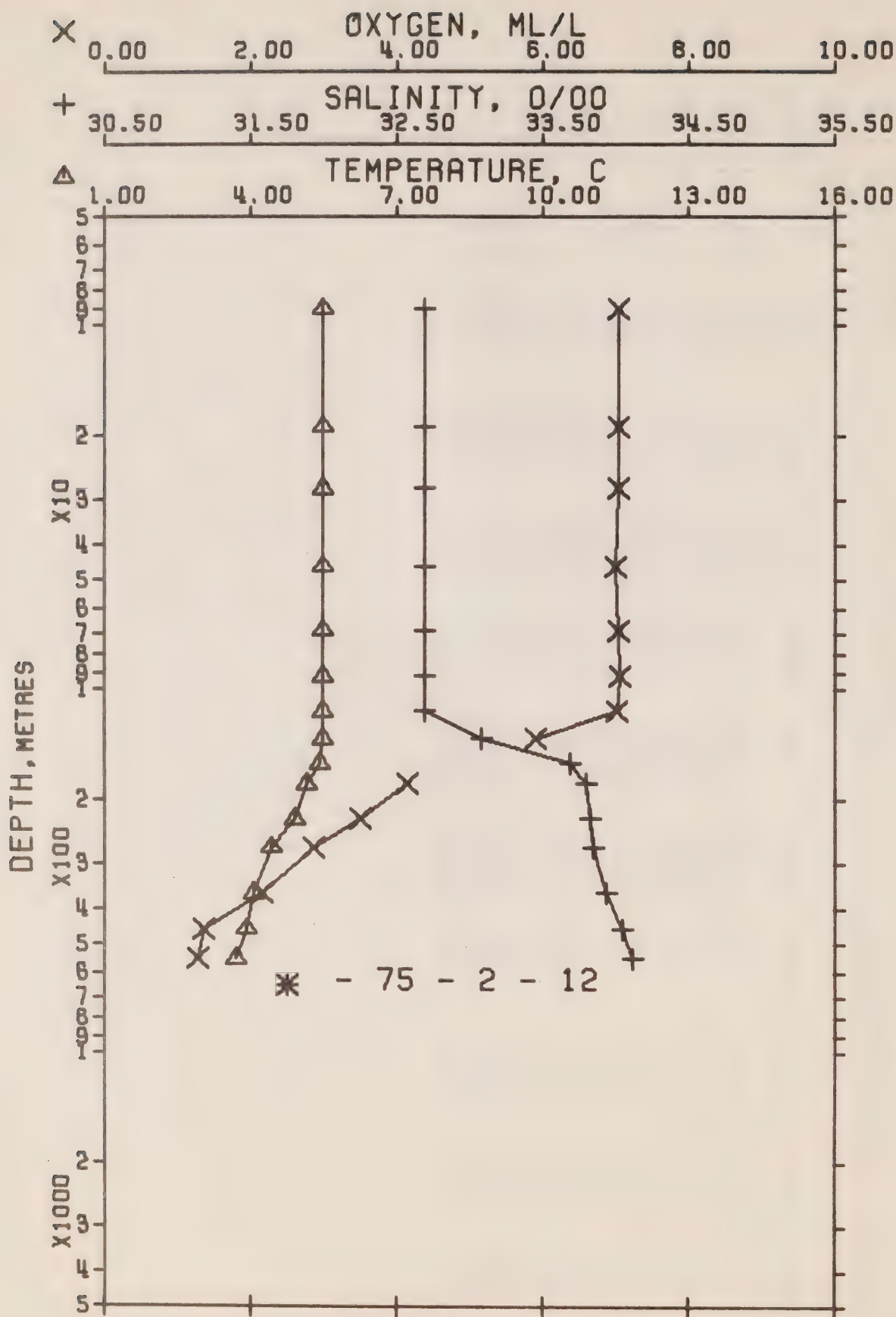
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JESSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N. 145- 0.0 W GMT 18.5

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.42	32.691	0	25.824	218.6	5.42	218.3	0.0	0.0	7.00	1470.
10	5.42	32.637	10	25.821	218.9	5.42	218.6	0.22	0.01	6.93	1470.
19	5.42	32.590	19	25.824	218.8	5.42	218.3	0.42	0.04		1470.
29	5.42	32.637	29	25.821	219.1	5.42	218.6	0.64	0.10	7.08	1470.
48	5.42	32.691	48	25.824	219.0	5.42	218.2	1.06	0.26	7.06	1470.
73	5.44	32.692	73	25.823	219.4	5.43	218.4	1.61	0.60	7.07	1471.
98	5.44	32.694	97	25.824	219.5	5.43	218.2	2.14	1.07	7.05	1471.
123	5.44	32.701	122	25.830	219.2	5.43	217.7	2.70	1.70		1472.
147	5.31	33.674	146	26.614	145.2	5.30	143.2	3.15	2.30	4.94	1473.
172	5.15	33.713	171	26.667	140.4	5.14	138.1	3.49	2.87	4.63	1473.
196	5.04	33.806	195	26.749	132.8	5.02	130.3	3.82	3.49	4.34	1473.
246	4.61	33.829	244	26.816	126.8	4.59	124.0	4.46	4.93	3.43	1472.
293	4.25	33.833	291	26.896	119.4	4.24	116.3	5.05	6.54	2.26	1471.



DATE 27/ 2/75

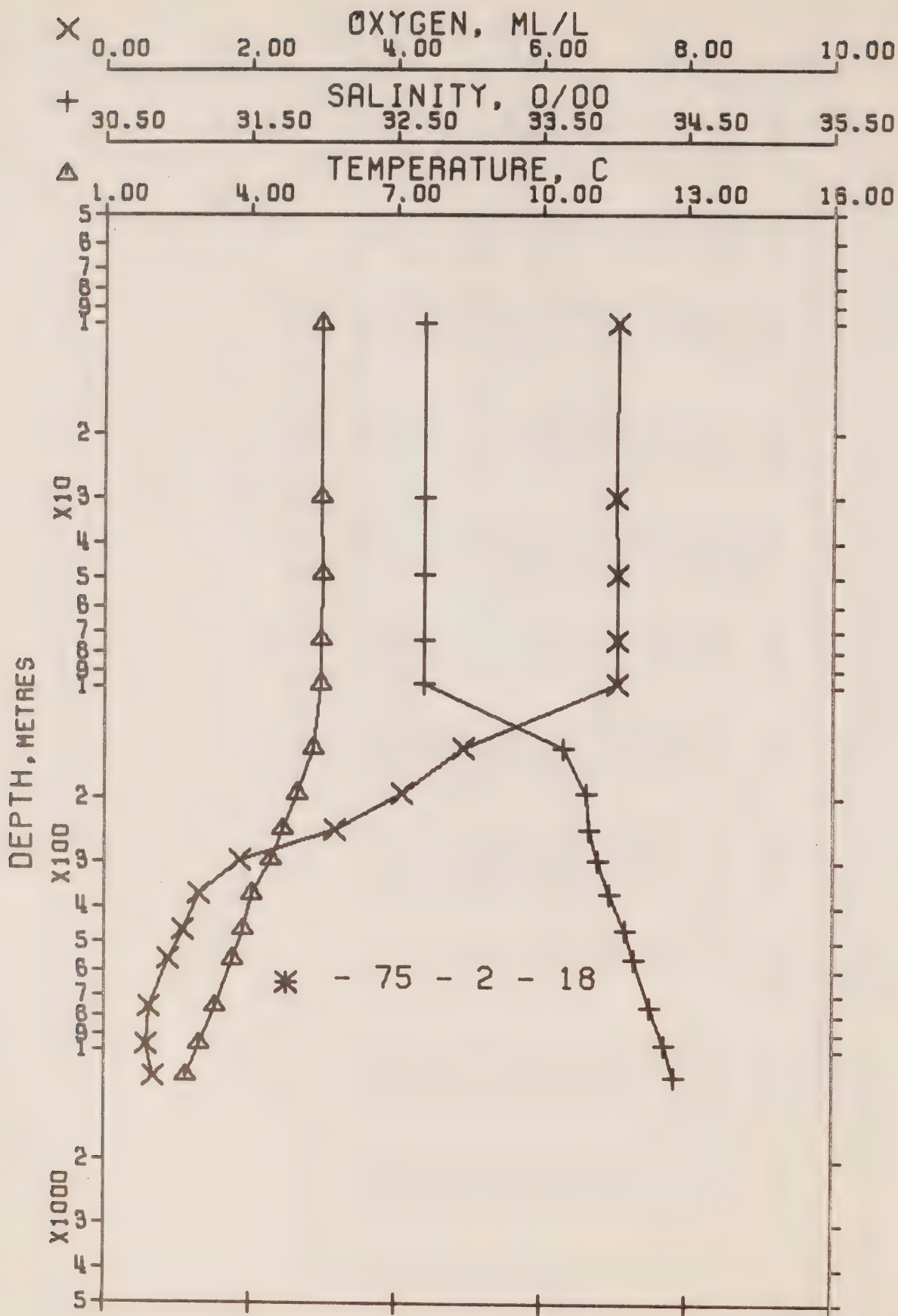
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OFFSHORE OCEANOGRAPHY GROUP

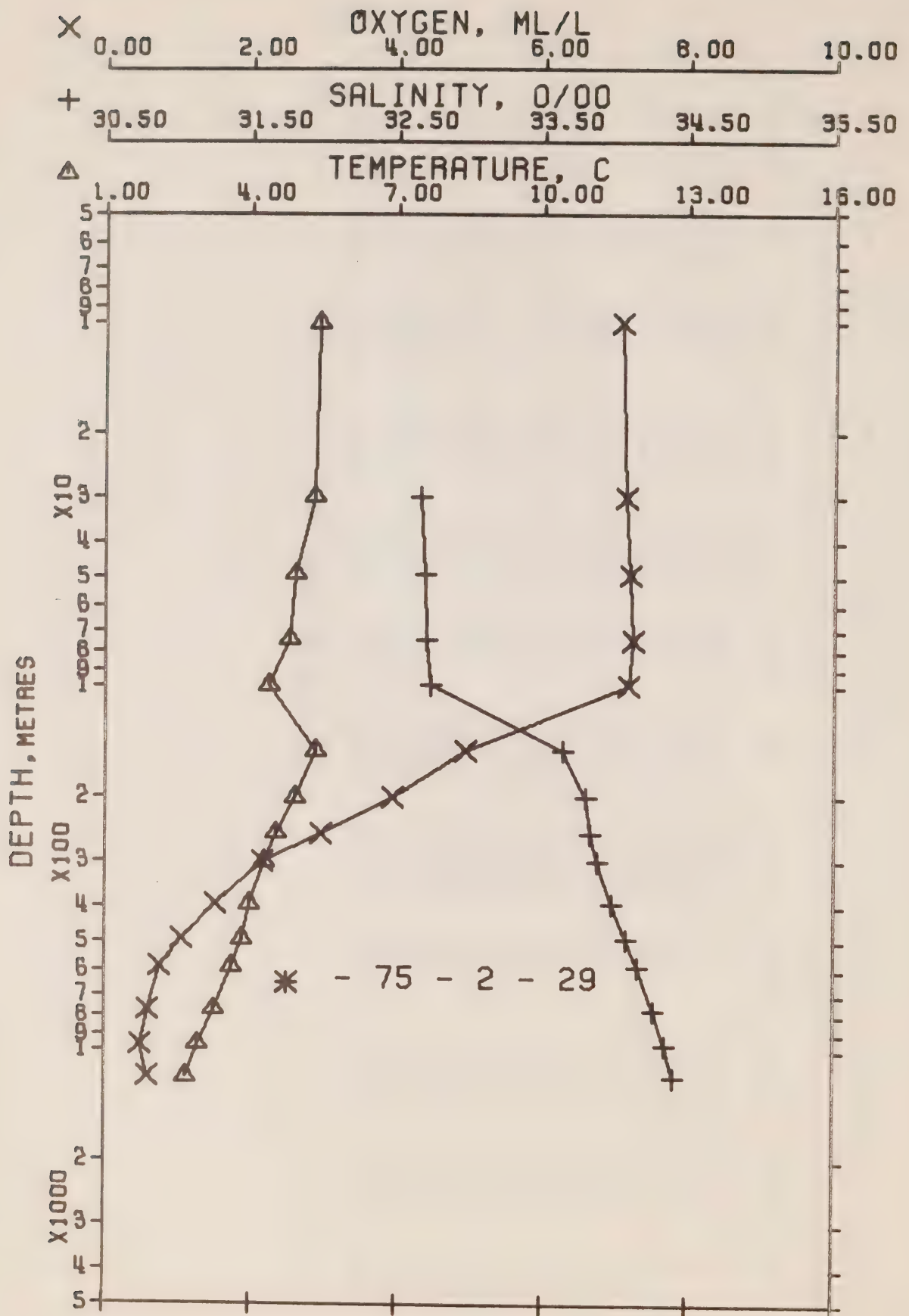
POSITION 50- 0.0 N, 145- 0.0 W GMT 18.0

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.50	32.698	0	25.821	218.9	5.50	218.7	0.0	0.0	7.04	1470.
9	5.48	32.692	9	25.818	219.2	5.48	218.9	0.20	0.01	7.04	1470.
19	5.46	32.693	19	25.821	219.0	5.46	218.6	0.42	0.04	7.04	1470.
28	5.47	32.693	28	25.820	219.2	5.47	218.7	0.62	0.09	7.03	1470.
46	5.48	32.692	46	25.818	219.6	5.48	218.9	1.01	0.24	7.00	1471.
69	5.48	32.692	69	25.818	219.8	5.47	218.9	1.52	0.54	7.03	1471.
93	5.48	32.690	92	25.817	220.2	5.47	219.0	2.03	0.96	7.05	1471.
116	5.48	32.689	115	25.816	220.5	5.47	219.1	2.55	1.51	7.02	1472.
138	5.48	33.077	137	26.122	191.7	5.47	189.9	3.01	2.11	5.90	1473.
161	5.41	33.694	160	26.618	145.0	5.40	142.8	3.40	2.69		1474.
183	5.15	33.804	182	26.735	134.1	5.14	131.7	3.70	3.23	4.14	1473.
229	4.89	33.829	227	26.785	129.7	4.87	127.0	4.29	4.48	3.51	1473.
274	4.42	33.852	272	26.855	123.2	4.40	120.3	4.87	5.95	2.85	1472.
366	4.05	33.941	363	26.964	113.5	4.02	109.9	5.95	9.48	2.16	1472.
459	3.90	34.049	455	27.065	104.6	3.87	100.2	6.96	13.73	1.37	1473.
555	3.70	34.121	550	27.142	97.9	3.66	92.9	7.93	18.73	1.27	1473.



OFFSHORE OCEANOGRAPHY GROUP											
POSITION 50- 0.0 N, 145- 0.0 W GMT 18.3											
HYDROGRAPHIC CAST DATA											
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	NOY	SOUND
0	5.48	32.696	0	25.821	218.8	5.48	218.6	0.0	0.0	7.06	1470.
10	5.45	32.694	10	25.823	218.7	5.45	218.4	0.22	0.01	7.04	1470.
30	5.44	32.691	30	25.822	219.0	5.44	218.5	0.66	0.10	7.03	1470.
49	5.47	32.691	49	25.819	219.6	5.47	218.8	1.08	0.27	7.04	1471.
74	5.44	32.691	74	25.822	219.5	5.43	218.4	1.63	0.62	7.05	1471.
99	5.45	32.691	98	25.821	219.8	5.44	218.5	2.17	1.09	7.03	1471.
148	5.70	33.650	147	26.596	146.9	5.29	144.9	3.08	2.22	4.92	1473.
197	4.97	33.809	196	26.760	131.8	4.95	129.3	3.75	3.40	4.08	1473.
248	4.65	33.830	246	26.812	127.2	4.63	124.4	4.40	4.88	3.17	1472.
300	4.41	33.890	298	26.886	120.6	4.39	117.3	5.05	6.70	1.86	1472.
373	4.03	33.970	370	26.989	111.1	4.00	107.4	5.89	9.58	1.29	1472.
468	3.85	34.079	464	27.094	101.8	3.82	97.5	6.90	13.90	1.09	1473.
564	3.64	34.145	559	27.167	95.4	3.60	90.5	7.84	18.86	0.88	1473.
767	3.29	34.253	756	27.287	85.2	3.24	79.1	9.64	30.98	0.63	1475.
970	2.95	34.353	961	27.398	75.4	2.88	68.4	11.30	45.64	0.57	1477.
1185	2.57	34.425	1173	27.480	68.3	2.59	60.5	12.83	62.50	0.68	1480.



DATE 10/ 3/75

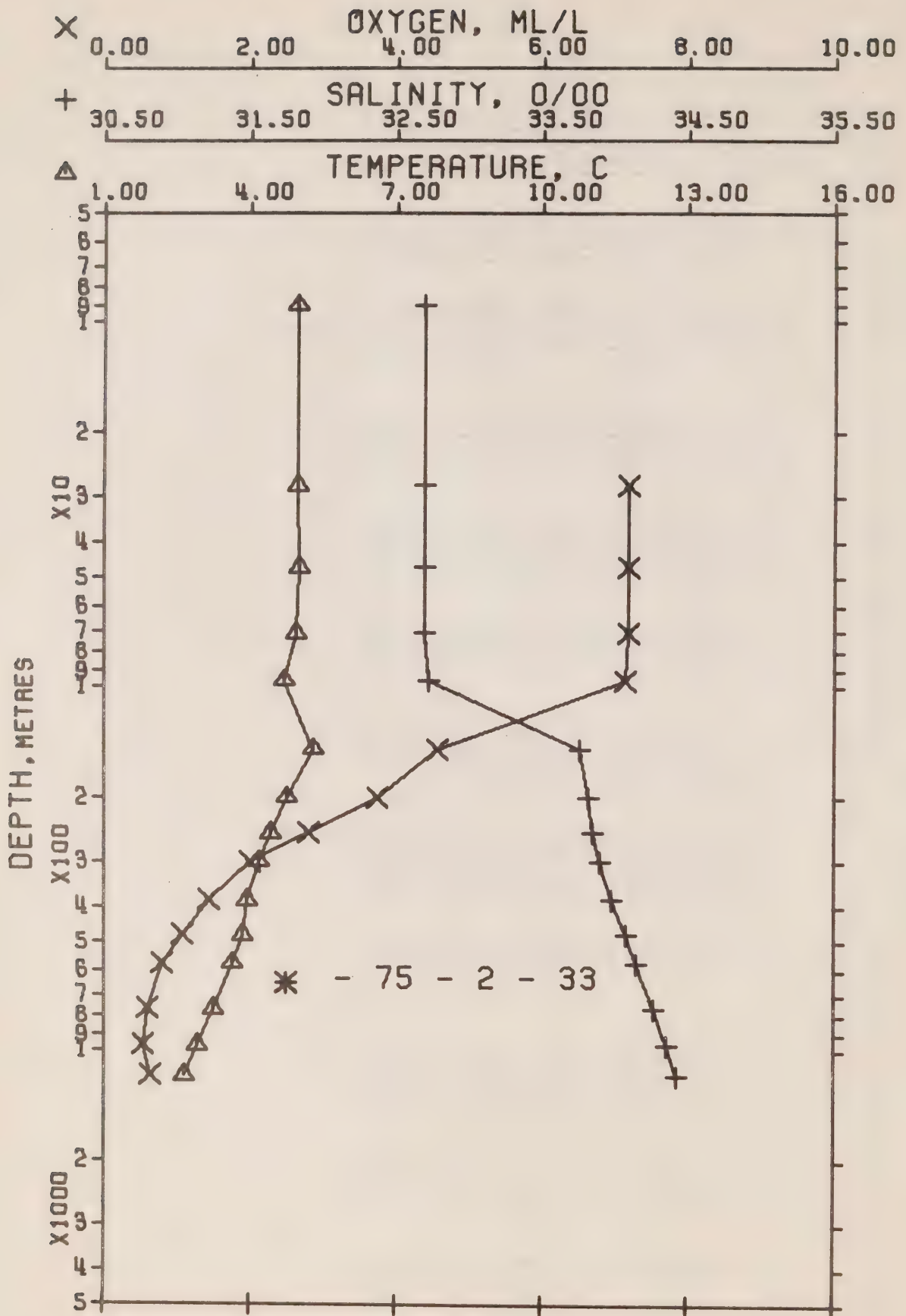
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OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GMT 17.6

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.42	32.704	0	25.835	217.6	5.42	217.3	0.0	0.0	7.09	1470.
10	5.38	32.688*	10	25.827	218.4	5.38	218.1	0.22	0.01	7.08	1470.
30	5.29	32.657	30	25.812	219.9	5.29	219.4	0.66	0.10	7.14	1470.
49	4.90	32.689	49	25.881	213.6	4.90	212.8	1.08	0.27	7.20	1468.
74	4.77	32.696	74	25.901	211.8	4.76	211.0	1.61	0.61	7.25	1468.
100	4.36	32.727	99	25.969	205.5	4.35	204.5	2.14	1.08	7.17	1467.
151	5.32	33.538	150	26.584	148.0	5.31	146.0	3.05	2.23	4.93	1473.
202	4.90	33.874	201	26.764	131.5	4.88	129.0	3.76	3.50	3.93	1472.
254	4.50	33.835	252	26.833	125.3	4.48	122.4	4.41	5.03	2.97	1472.
304	4.26	33.877	302	26.991	120.0	4.24	116.8	5.03	6.79	2.16	1471.
397	3.97	33.976	394	27.000	110.3	3.94	106.5	6.10	10.60	1.51	1472.
496	3.83	34.081	492	27.098	101.8	3.79	97.1	7.15	15.37	1.05	1473.
590	3.60	34.157	585	27.181	94.3	3.56	89.2	8.07	20.46	0.75	1474.
775	3.26	34.270	768	27.303	83.7	3.21	77.4	9.70	31.86	0.60	1475.
969	2.91	34.351	960	27.400	75.1	2.84	68.2	11.24	45.50	0.51	1477.
1190	2.67	34.411	1178	27.469	69.4	2.59	61.6	12.83	62.97	0.60	1483.



DATE 17/ 3/75

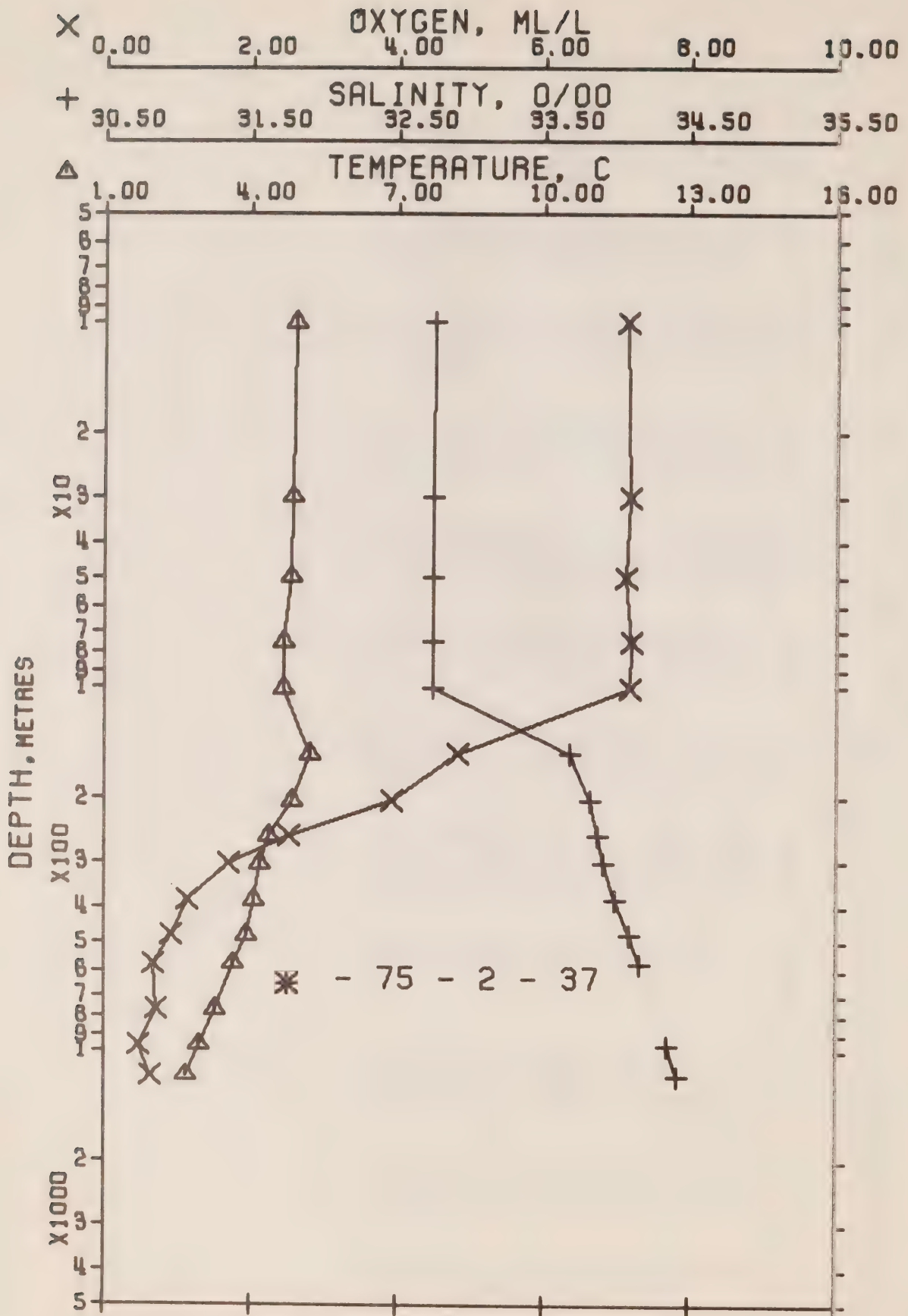
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OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GWT 17.4

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	CRY	SOUND
0	4.98	32.704	0	25.884	212.8	4.93	212.6	0.0	0.0	7.20	1468.
9	4.96	32.694	9	25.879	213.5	4.96	213.2	0.19	0.01		1468.
28	4.95	32.690	28	25.877	213.8	4.95	213.4	0.60	0.09	7.19	1468.
47	4.99	32.689	47	25.872	214.5	4.99	213.8	1.01	0.24	7.18	1469.
71	4.93	32.694	71	25.882	213.7	4.92	212.8	1.53	0.56	7.18	1469.
97	4.69	32.725	96	25.933	209.0	4.68	207.9	2.06	1.02	7.13	1468.
149	5.28	33.758	148	26.684	138.6	5.27	136.6	2.98	2.14	4.57	1473.
201	4.75	33.819	200	26.792	128.7	4.73	126.3	3.66	3.37	3.75	1472.
253	4.42	33.849	251	26.852	123.3	4.40	120.6	4.31	4.86	2.80	1471.
302	4.19	33.899	300	26.916	117.6	4.17	114.4	4.90	6.55	2.01	1471.
387	3.95	33.984	384	27.008	109.4	3.92	105.6	5.86	9.92	1.44	1472.
482	3.84	34.083	478	27.098	101.6	3.81	97.0	6.86	14.35	1.08	1473.
578	3.65	34.149	573	27.170	95.4	3.61	90.3	7.81	19.45	0.80	1474.
773	3.26	34.274	766	27.307	83.7	3.21	77.2	9.54	31.40	0.60	1475.
974	2.92	34.360	965	27.426	74.6	2.85	67.7	11.13	45.50	0.53	1477.
1184	2.66	34.428	1172	27.484	68.0	2.58	60.3	12.62	61.88	0.63	1480.



RESULTS OF STP OBSERVATIONS
(P-75-2)

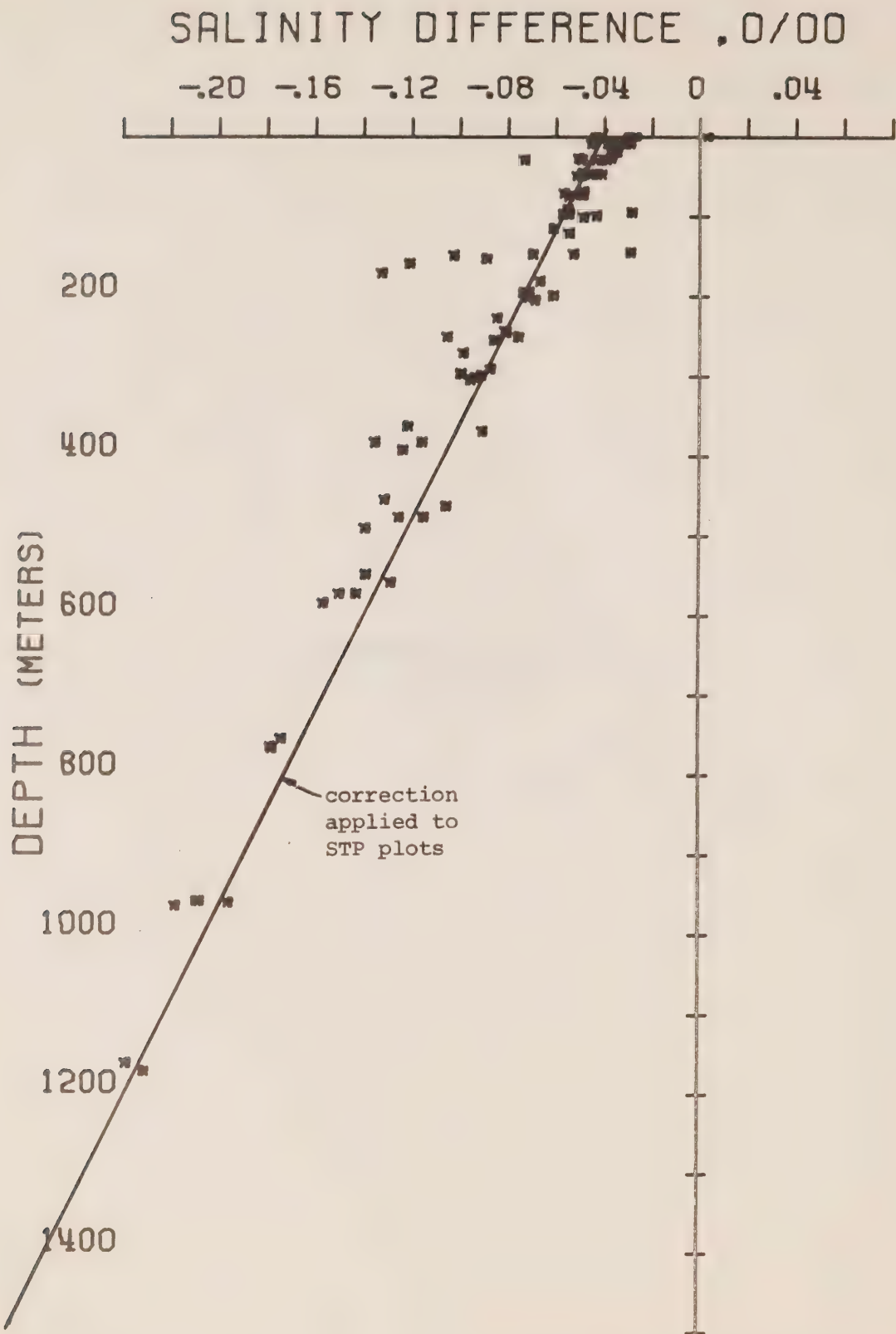


Figure 5. Salinity difference between hydro data and STP. P-75-2

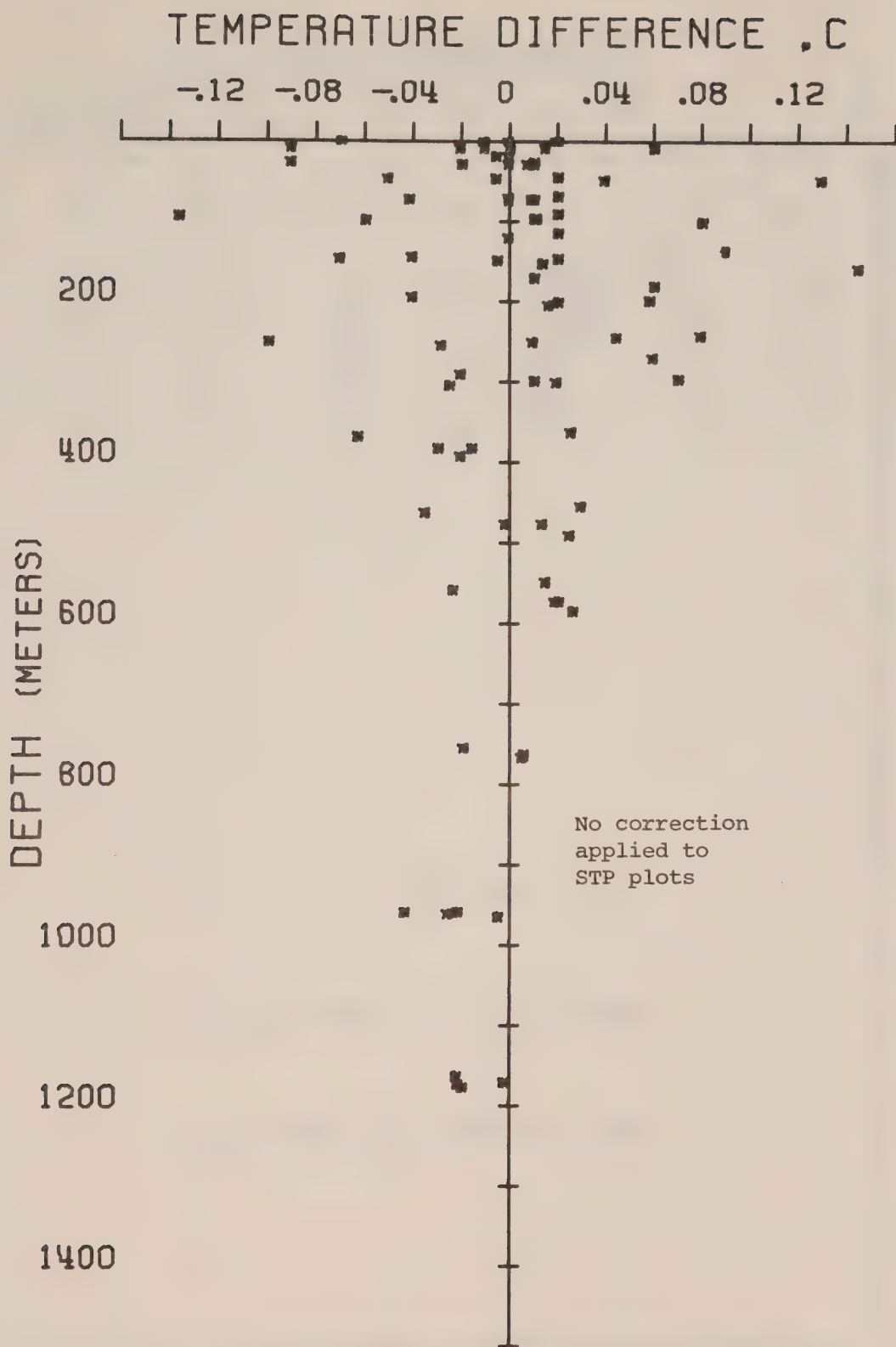
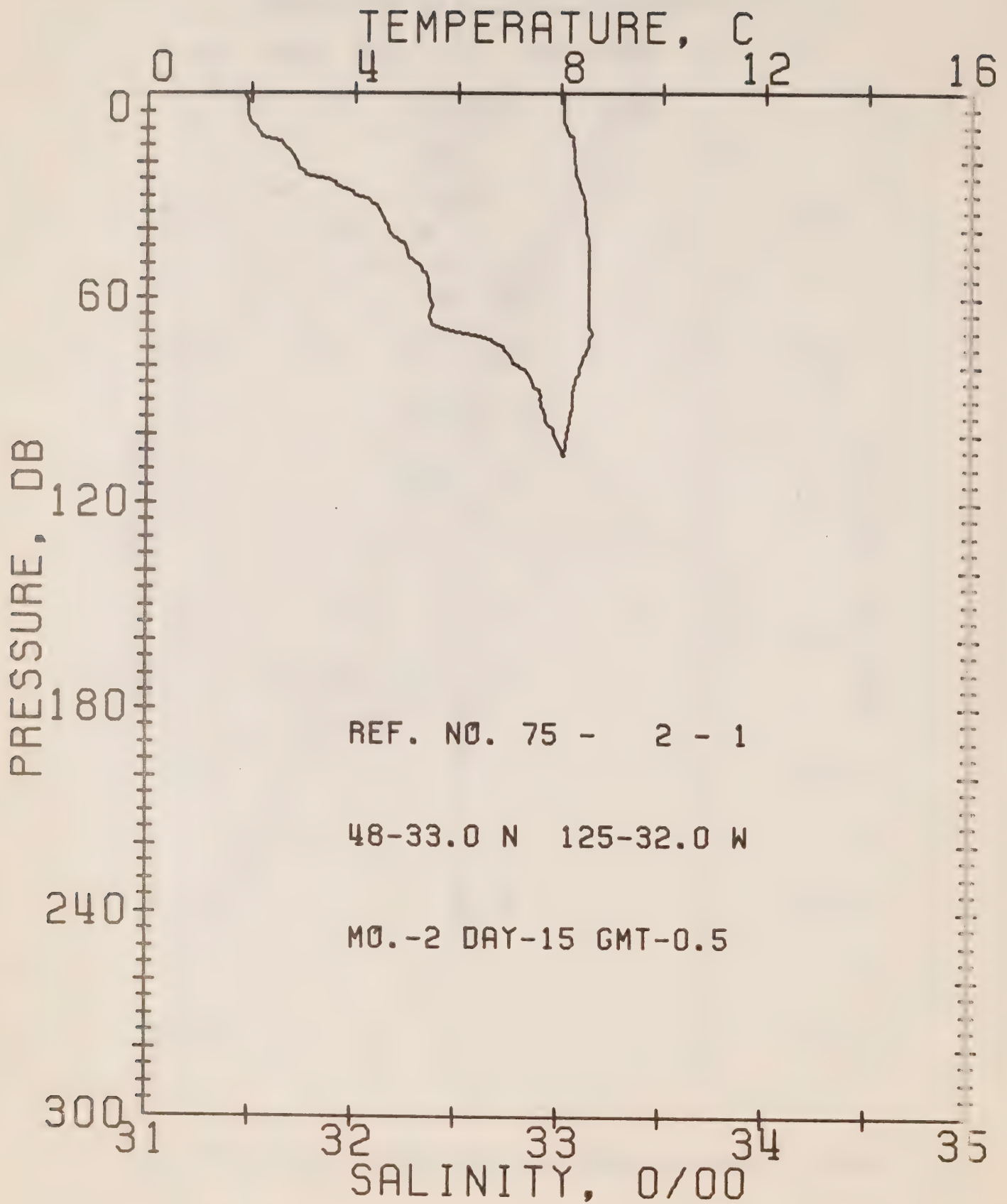


Figure 6. Temperature difference between hydro data and STP. P-75-2



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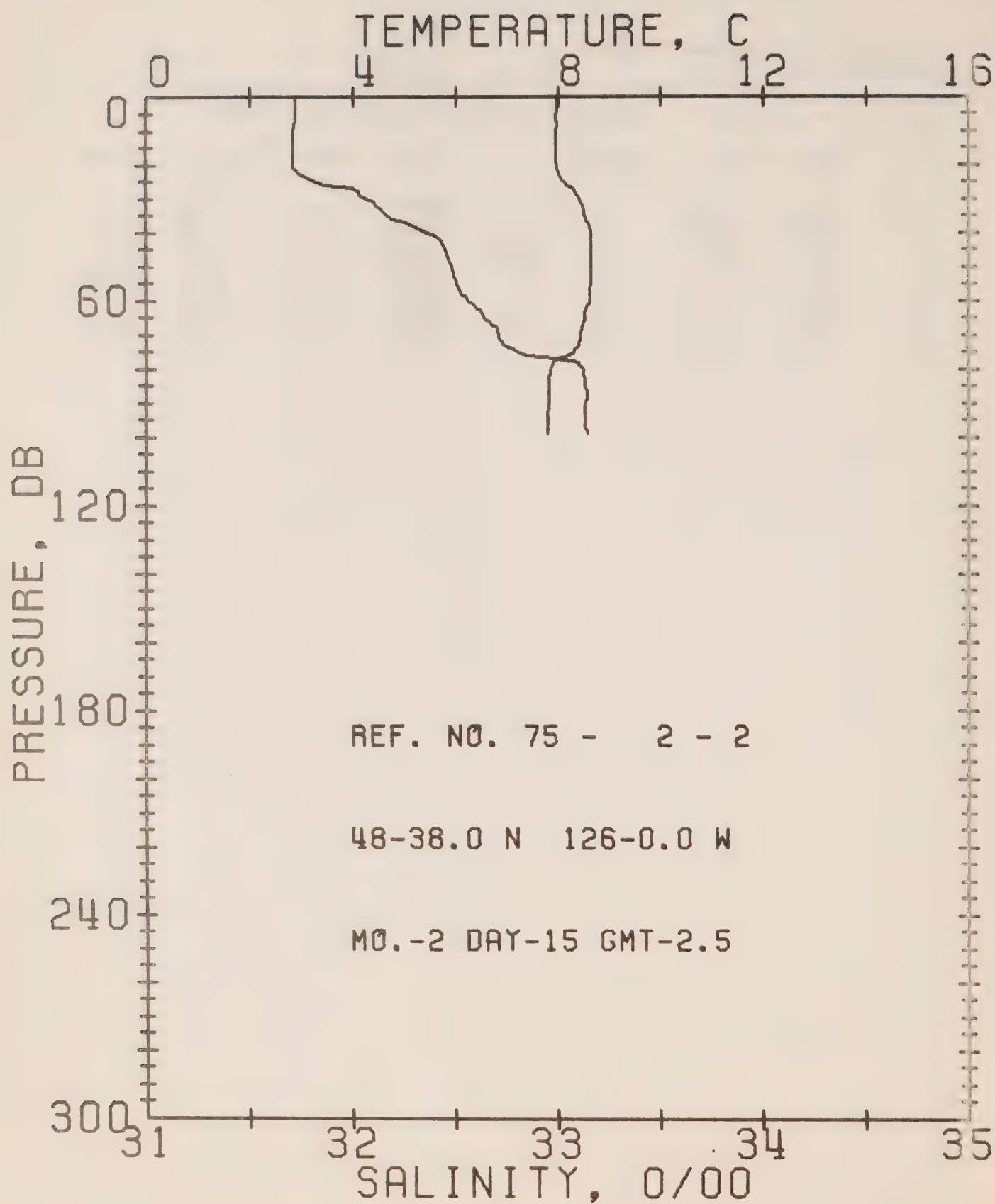
REFERENCE NO. 75- 2- 1

DATE 15/ 2/75

POSITION 48-33.0N, 125-32.0W GMT 0.5

RESULTS OF STP CAST 82 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.04	31.46	0	24.52	342.7	0.0	0.0	1478.
10	8.10	31.52	10	24.56	339.4	0.34	0.02	1479.
20	8.27	31.72	20	24.68	327.3	0.67	0.07	1480.
30	8.45	32.00	30	24.88	308.8	0.99	0.15	1481.
50	8.55	32.31	50	25.11	287.4	1.59	0.39	1482.
75	8.52	32.73	75	25.44	256.2	2.29	0.84	1483.
100	8.12	32.97	99	25.69	233.1	2.89	1.37	1482.



OFFSHORE OCEANOGRAPHY GROUP

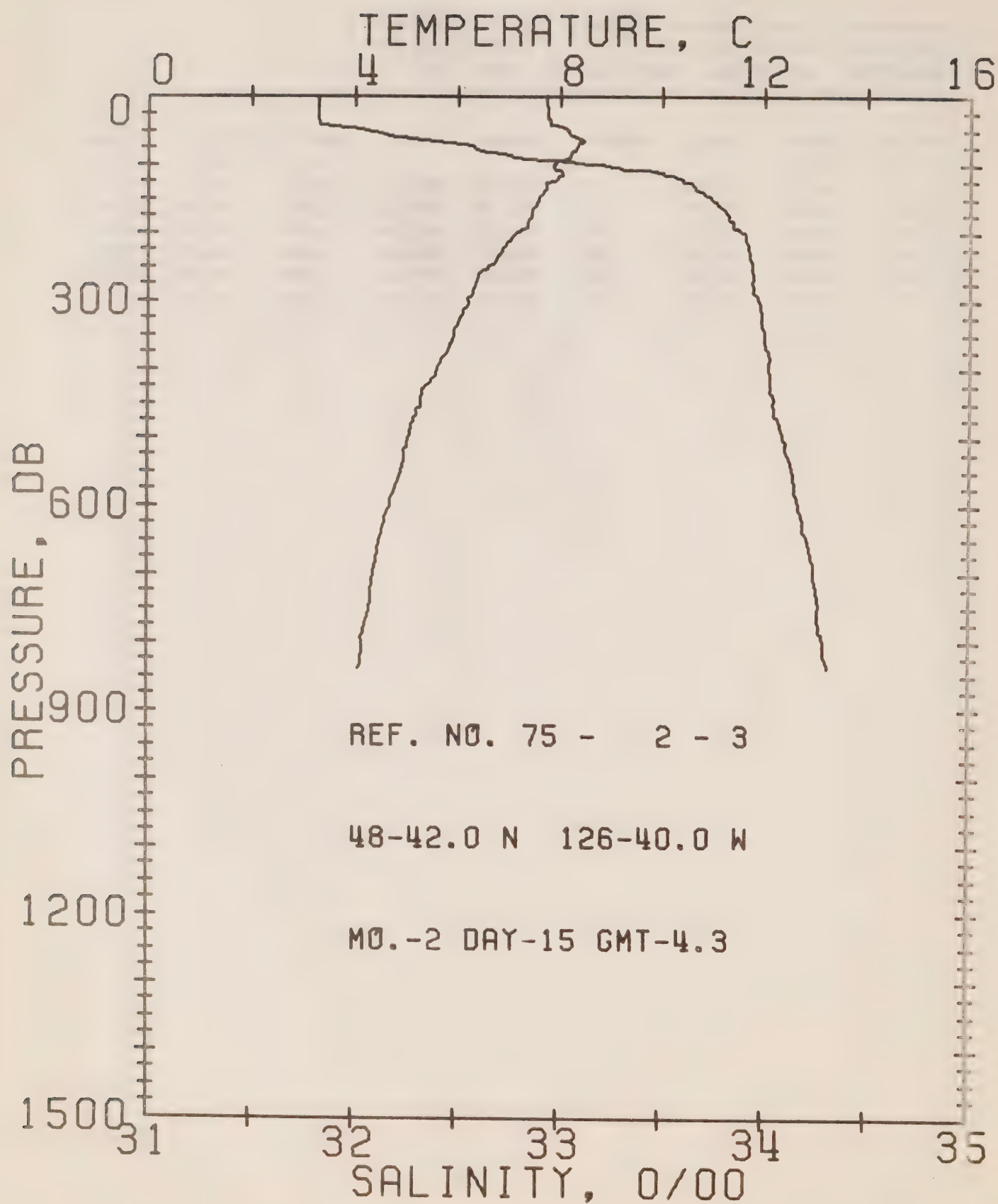
REFERENCE NO. 75- 2- 2

DATE 15/ 2/75

POSITION 48-38.0N, 126- 0.0W GMT 2.5

RESULTS OF STP CAST 78 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.98	31.72	0	24.73	322.5	0.0	0.0	1479.
10	7.96	31.71	10	24.73	323.1	0.32	0.02	1479.
20	7.97	31.71	20	24.72	323.6	0.65	0.07	1479.
30	8.43	32.06	30	24.93	304.1	0.96	0.15	1481.
50	8.64	32.48	50	25.23	276.1	1.54	0.38	1483.
75	8.29	32.81	75	25.54	247.0	2.20	0.80	1482.



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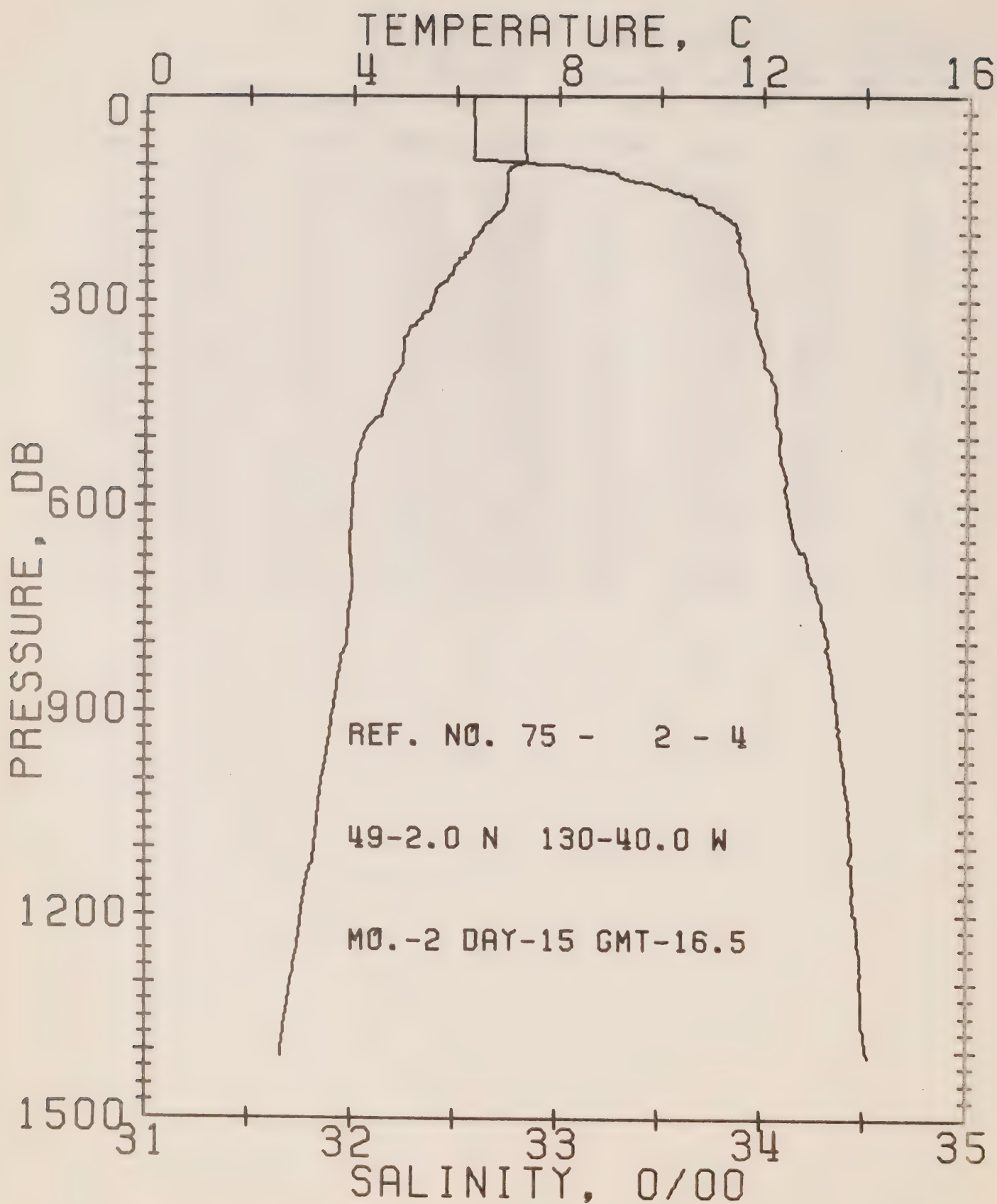
REFERENCE NO. 75- 2- 3

DATE 15/ 2/75

POSITION 48-42.0N, 126-40.0W GMT 4.3

RESULTS OF STP CAST 258 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.74	31.82	0	24.84	311.8	0.0	0.0	1478.
10	7.74	31.82	10	24.84	312.2	0.31	0.02	1478.
20	7.75	31.82	20	24.84	312.4	0.62	0.06	1478.
30	7.77	31.82	30	24.84	312.8	0.94	0.14	1478.
50	8.18	32.07	50	24.97	300.1	1.56	0.40	1481.
75	8.31	32.58	75	25.35	264.4	2.27	0.85	1482.
100	7.89	33.17	99	25.88	215.0	2.88	1.39	1482.
125	7.76	33.60	124	26.23	181.6	3.37	1.95	1482.
150	7.58	33.74	149	26.37	169.1	3.80	2.56	1482.
175	7.43	33.82	174	26.46	161.1	4.22	3.24	1482.
200	7.14	33.90	199	26.56	151.9	4.61	3.99	1481.
225	6.87	33.92	223	26.61	147.2	4.98	4.80	1481.
250	6.58	33.94	248	26.66	142.2	5.35	5.68	1480.
300	6.22	33.97	298	26.74	135.9	6.04	7.62	1479.
400	5.59	34.02	397	26.85	125.7	7.34	12.27	1479.
500	5.03	34.09	496	26.98	114.5	8.54	17.76	1478.
600	4.68	34.17	595	27.08	105.6	9.65	23.93	1478.
800	4.16	34.29	793	27.23	92.5	11.61	37.93	1480.



OFFSHORE OCEANOGRAPHY GROUP

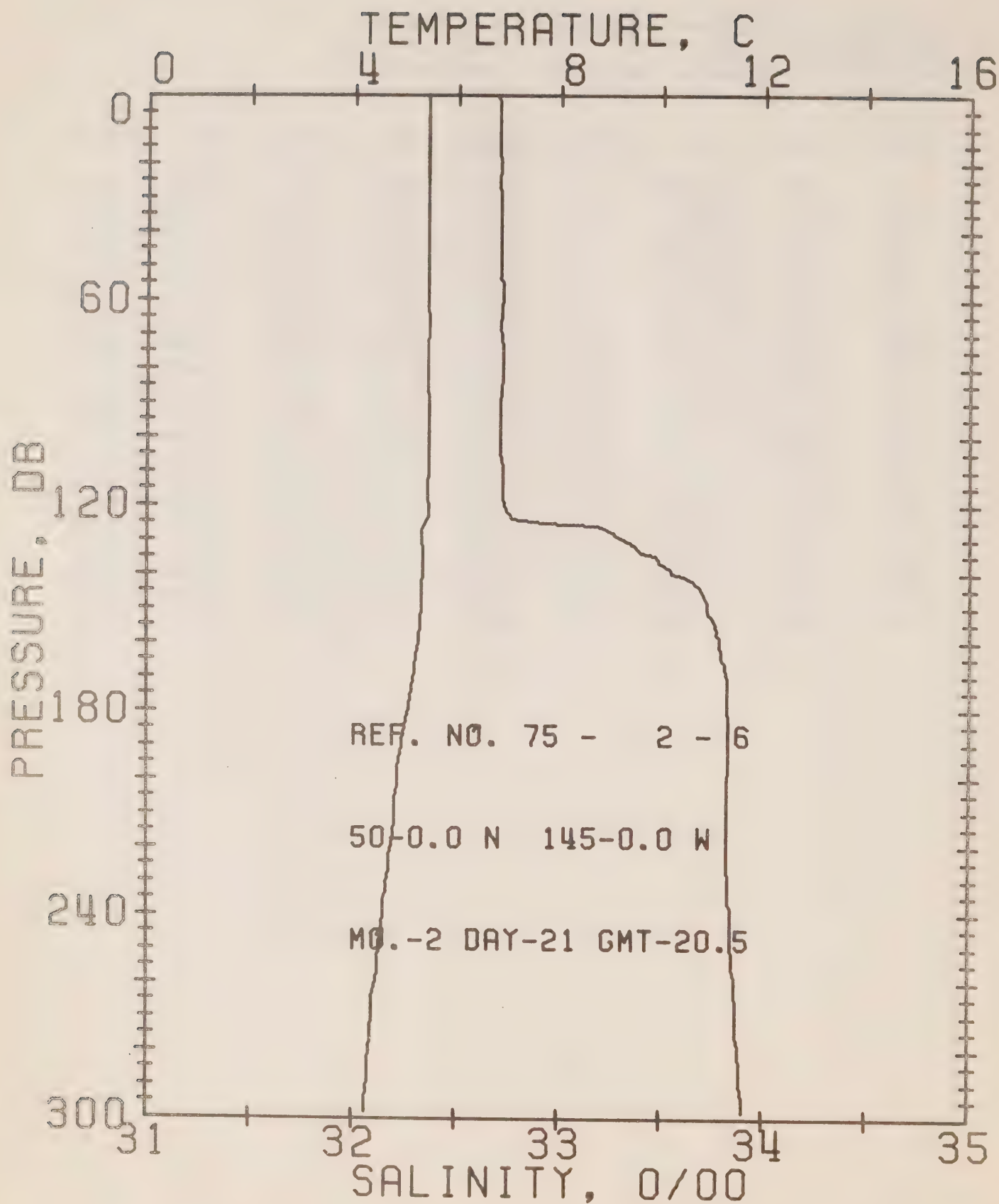
REFERENCE NO. 75- 2- 4

DATE 15/ 2/75

POSITION 49- 2.0N, 130-40.0W GMT 16.5

RESULTS OF STP CAST 334 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.34	32.59	0	25.50	249.1	0.0	0.0	1477.
10	7.34	32.58	10	25.49	250.1	0.25	0.01	1477.
20	7.34	32.58	20	25.49	250.3	0.50	0.05	1478.
30	7.34	32.58	30	25.50	250.1	0.75	0.11	1478.
50	7.34	32.59	50	25.50	250.0	1.25	0.32	1478.
75	7.34	32.59	75	25.50	250.3	1.88	0.72	1478.
100	7.24	32.56	99	25.81	221.8	2.49	1.26	1479.
125	6.98	33.36	124	26.16	188.6	2.99	1.84	1479.
150	6.95	33.66	149	26.40	166.3	3.43	2.45	1480.
175	6.74	33.80	174	26.53	153.7	3.83	3.12	1479.
200	6.44	33.88	199	26.64	144.1	4.20	3.82	1479.
225	6.25	33.88	223	26.66	142.1	4.56	4.60	1478.
250	5.96	33.91	248	26.72	136.4	4.91	5.44	1478.
300	5.54	33.94	298	26.80	129.8	5.57	7.30	1477.
400	4.89	34.03	397	26.94	116.8	6.80	11.66	1476.
500	4.19	34.09	496	27.07	105.0	7.90	16.73	1475.
600	3.99	34.12	595	27.12	101.1	8.93	22.51	1475.
800	3.90	34.32	793	27.28	87.2	10.82	35.88	1479.
1000	3.42	34.40	990	27.39	77.3	12.45	50.88	1480.
1200	3.01	34.46	1188	27.48	69.6	13.93	67.37	1482.



OFFSHORE OCEANOGRAPHY GROUP

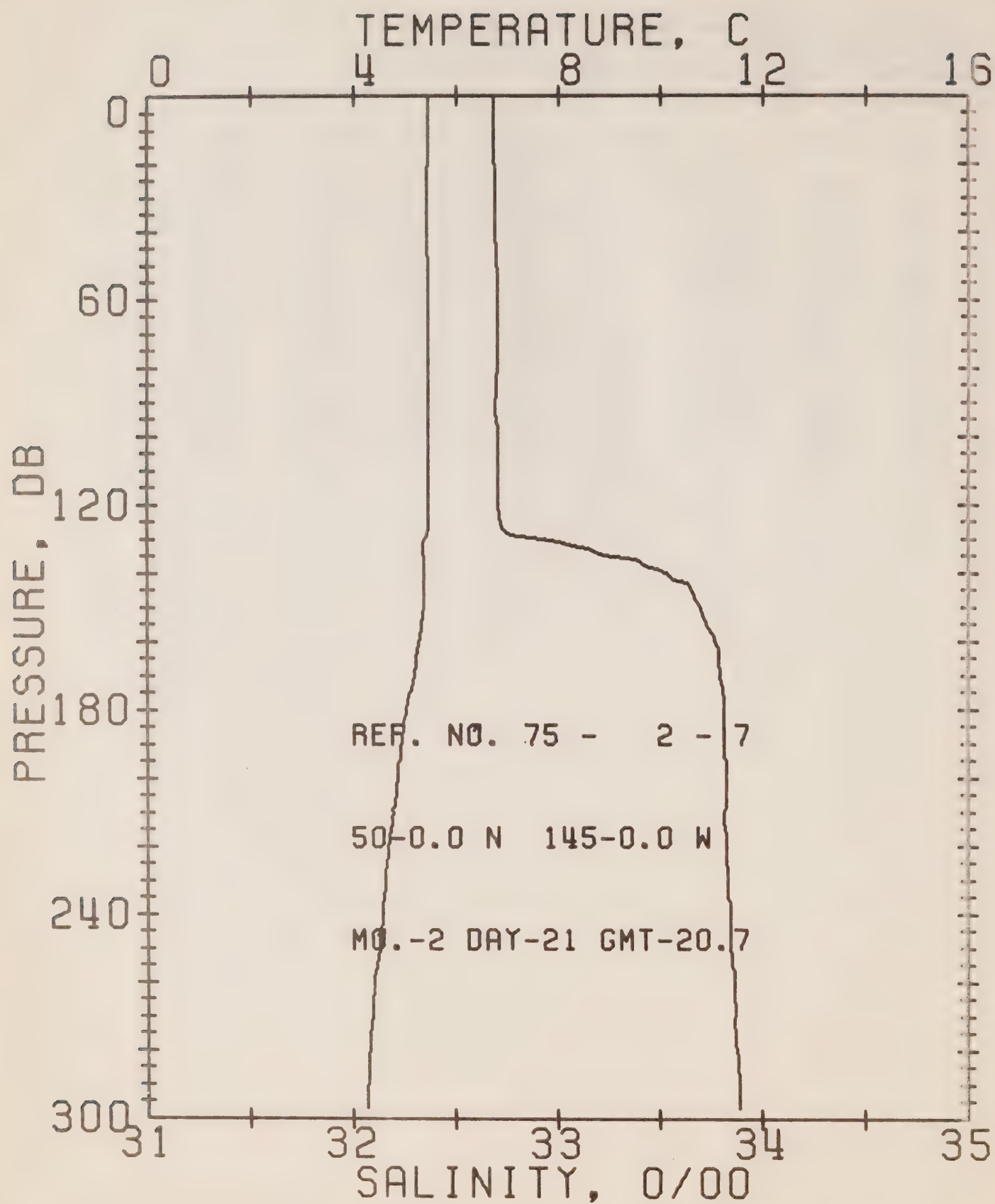
REFERENCE NO. 75- 2- 6

DATE 21/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 20.5

RESULTS OF STP CAST 147 FCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.42	32.69	0	25.82	218.4	0.0	0.0	1470.
10	5.42	32.70	10	25.83	217.9	0.22	0.01	1470.
20	5.42	32.71	20	25.84	217.3	0.44	0.04	1470.
30	5.42	32.71	30	25.84	217.4	0.65	0.10	1470.
50	5.42	32.71	50	25.84	217.6	1.09	0.28	1471.
75	5.42	32.72	75	25.85	217.1	1.63	0.62	1471.
100	5.43	32.71	99	25.84	218.2	2.18	1.11	1471.
125	5.36	32.92	124	26.01	202.0	2.72	1.73	1472.
150	5.30	33.72	149	26.65	141.7	3.12	2.29	1473.
175	5.10	33.82	174	26.75	132.2	3.46	2.85	1473.
200	4.85	33.82	199	26.78	129.6	3.78	3.47	1472.
225	4.69	33.82	223	26.80	128.1	4.10	4.17	1472.
250	4.50	33.84	248	26.84	124.6	4.42	4.93	1471.



OFFSHORE OCEANOGRAPHY GROUP

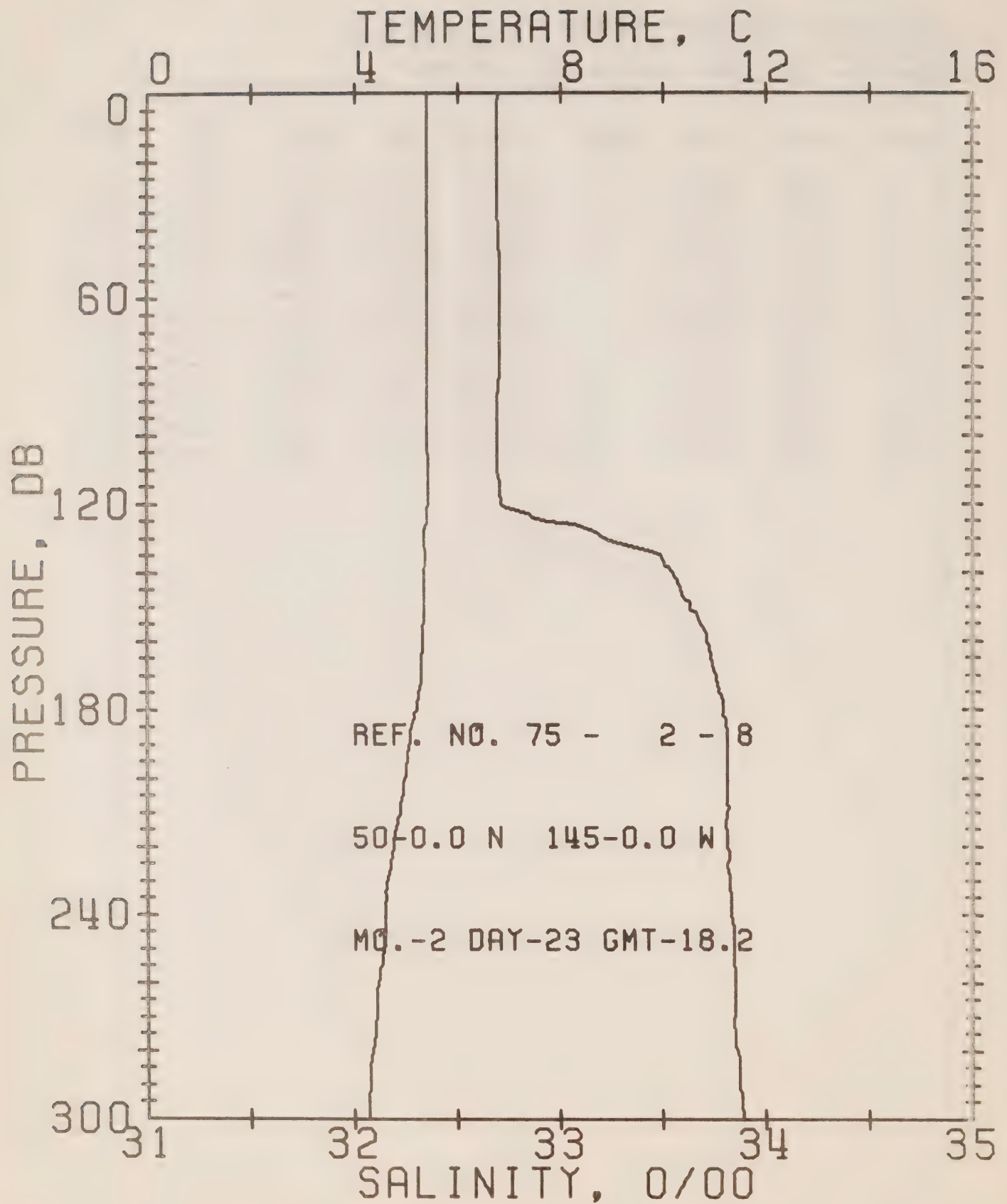
REFERENCE NO. 75- 2- 7

DATE 21/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 20.7

RESULTS OF STP CAST 130 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.43	32.68	0	25.81	219.2	0.0	0.0	1470.
10	5.44	32.68	10	25.81	219.6	0.22	0.01	1470.
20	5.43	32.68	20	25.82	219.3	0.44	0.04	1470.
30	5.42	32.69	30	25.82	218.9	0.66	0.10	1470.
50	5.43	32.70	50	25.83	218.7	1.10	0.28	1471.
75	5.43	32.70	75	25.83	218.7	1.64	0.63	1471.
100	5.43	32.70	99	25.83	218.9	2.19	1.12	1471.
125	5.44	32.71	124	25.84	218.3	2.74	1.74	1472.
150	5.34	33.69	149	26.62	144.7	3.17	2.35	1473.
175	5.08	33.80	174	26.74	133.4	3.52	2.92	1473.
200	4.85	33.82	199	26.78	129.6	3.84	3.54	1472.
225	4.64	33.82	223	26.81	127.6	4.17	4.24	1472.
250	4.50	33.84	248	26.84	124.8	4.48	5.00	1471.



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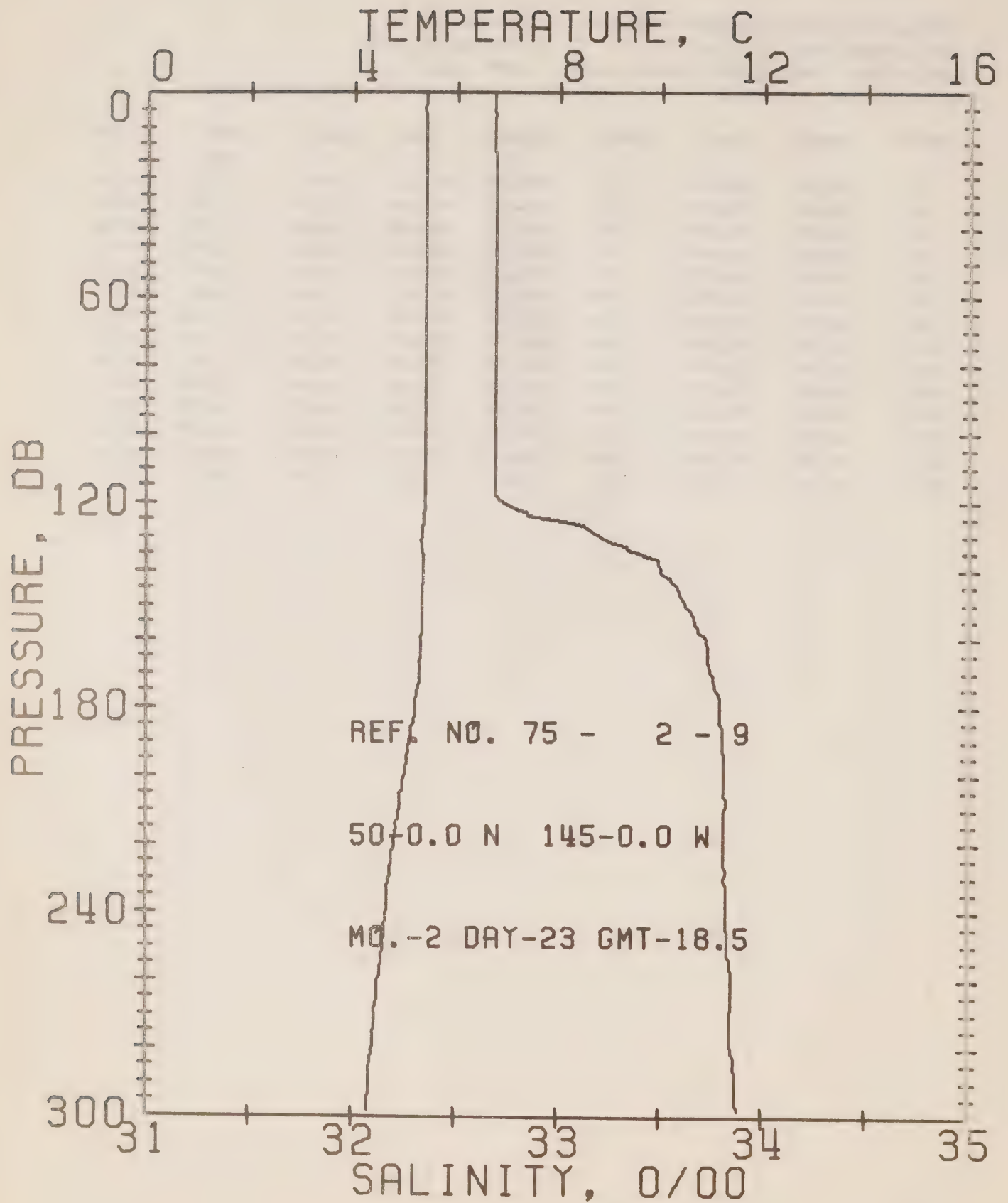
REFERENCE NO. 75- 2- 8

DATE 23/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 18.2

RESULTS OF STP CAST 137 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.39	32.70	0	25.83	217.3	0.0	0.0	1470.
10	5.39	32.69	10	25.83	218.4	0.22	0.01	1470.
20	5.39	32.69	20	25.83	218.5	0.44	0.04	1470.
30	5.39	32.69	30	25.83	218.6	0.66	0.10	1470.
50	5.39	32.70	50	25.83	218.1	1.09	0.28	1470.
75	5.39	32.70	75	25.83	218.3	1.64	0.63	1471.
100	5.40	32.69	99	25.83	219.4	2.18	1.11	1471.
125	5.38	32.94	124	26.03	200.7	2.73	1.74	1472.
150	5.34	33.63	149	26.58	148.9	3.14	2.31	1473.
175	5.23	33.77	174	26.70	137.4	3.49	2.90	1473.
200	4.95	33.81	199	26.76	131.5	3.83	3.53	1472.
225	4.68	33.81	223	26.79	128.8	4.15	4.24	1472.
250	4.55	33.84	248	26.83	125.3	4.47	5.01	1472.
300	4.26	33.89	298	26.90	118.9	5.08	6.72	1471.



OFFSHORE OCEANOGRAPHY GROUP

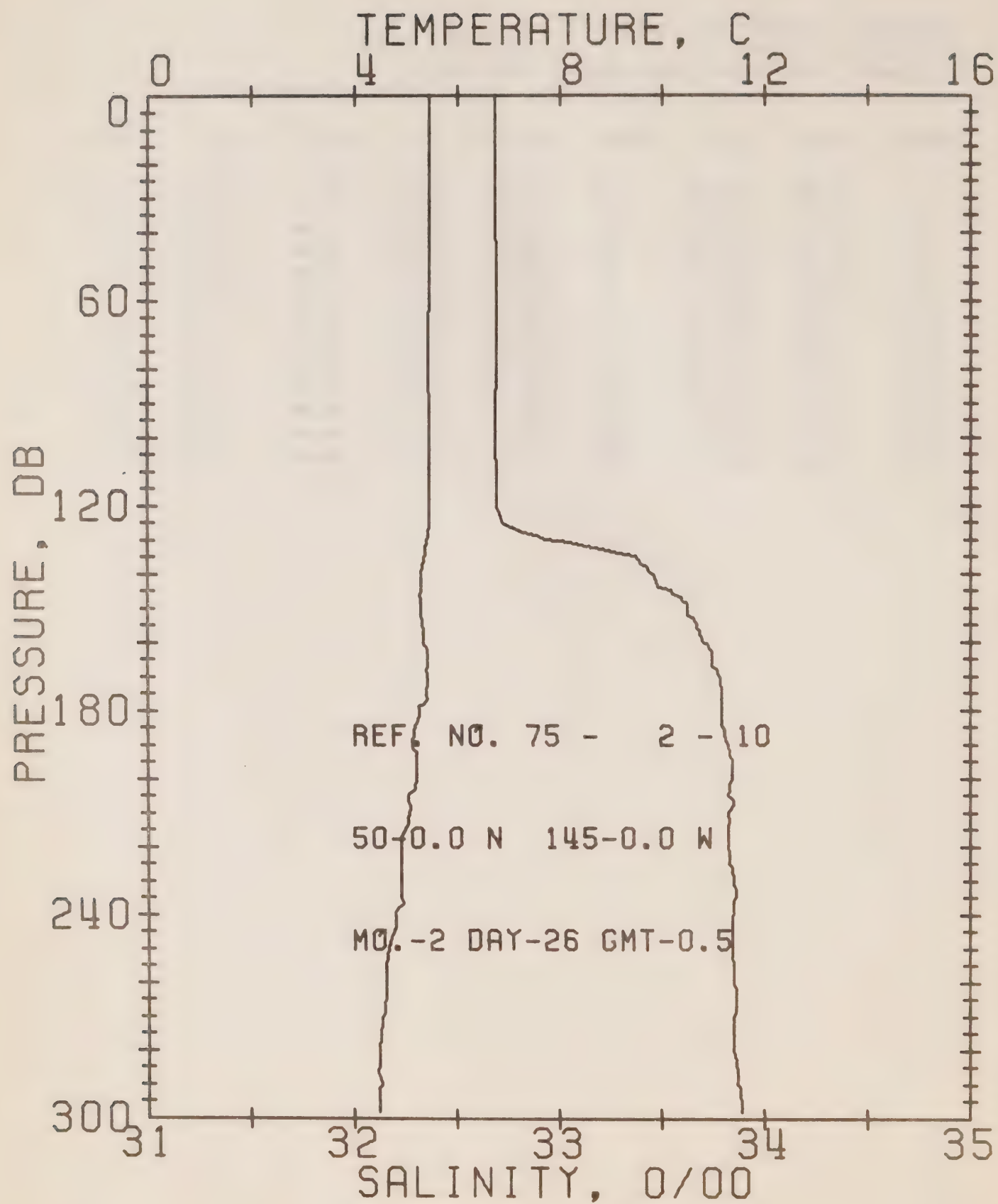
REFERENCE NO. 75- 2- 9

DATE 23/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 18.5

RESULTS OF STP CAST 152 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.38	32.68	0	25.82	218.7	0.0	0.0	1469.
10	5.38	32.68	10	25.82	219.0	0.22	0.01	1470.
20	5.38	32.69	20	25.83	218.6	0.44	0.04	1470.
30	5.38	32.69	30	25.83	218.5	0.66	0.10	1470.
50	5.39	32.69	50	25.83	218.8	1.09	0.28	1470.
75	5.39	32.69	75	25.83	219.0	1.64	0.63	1471.
100	5.40	32.69	99	25.83	219.4	2.19	1.12	1471.
125	5.37	32.98	124	26.06	197.5	2.73	1.74	1472.
150	5.33	33.62	149	26.57	149.5	3.15	2.32	1473.
175	5.23	33.77	174	26.70	137.4	3.50	2.91	1473.
200	4.98	33.81	199	26.76	131.8	3.84	3.55	1473.
225	4.74	33.81	223	26.79	129.4	4.16	4.25	1472.
250	4.59	33.83	248	26.82	126.5	4.48	5.03	1472.



OFFSHORE OCEANOGRAPHY GROUP

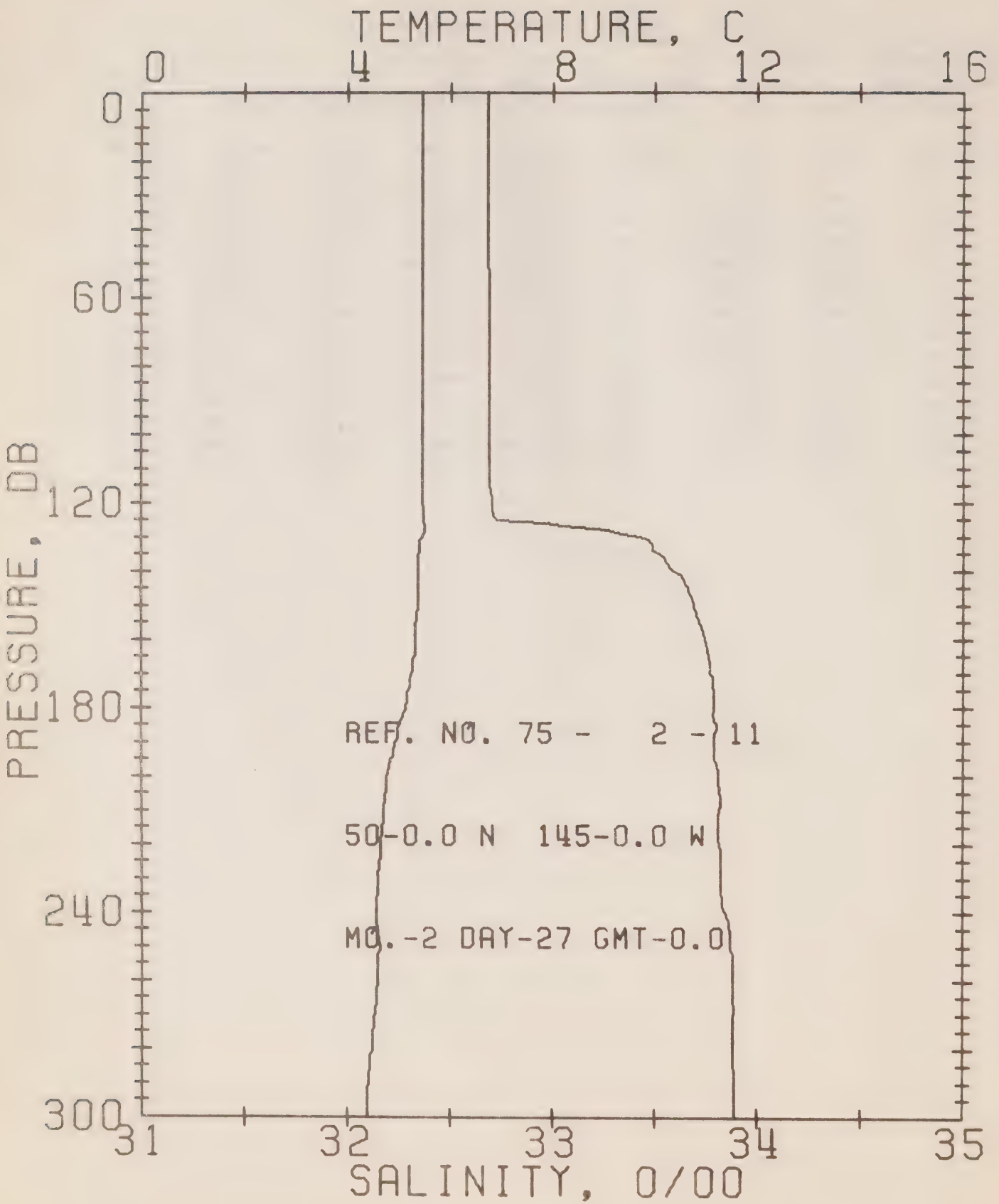
REFERENCE NO. 75- 2- 10

DATE 26/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 0.5

RESULTS OF STP CAST 150 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.44	32.68	0	25.81	219.3	0.0	0.0	1470.
10	5.44	32.68	10	25.81	219.6	0.22	0.01	1470.
20	5.44	32.68	20	25.81	219.7	0.44	0.04	1470.
30	5.44	32.68	30	25.81	219.9	0.66	0.10	1470.
50	5.43	32.69	50	25.82	219.2	1.10	0.28	1471.
75	5.42	32.69	75	25.82	219.4	1.65	0.63	1471.
100	5.43	32.68	99	25.81	220.5	2.20	1.12	1471.
125	5.43	32.72	124	25.85	217.7	2.75	1.75	1472.
150	5.29	33.62	149	26.57	149.0	3.18	2.36	1473.
175	5.39	33.79	174	26.70	137.8	3.54	2.95	1474.
200	5.19	33.84	199	26.76	132.0	3.87	3.59	1474.
225	4.90	33.83	223	26.78	129.7	4.20	4.30	1473.
250	4.67	33.84	248	26.82	126.7	4.52	5.07	1472.



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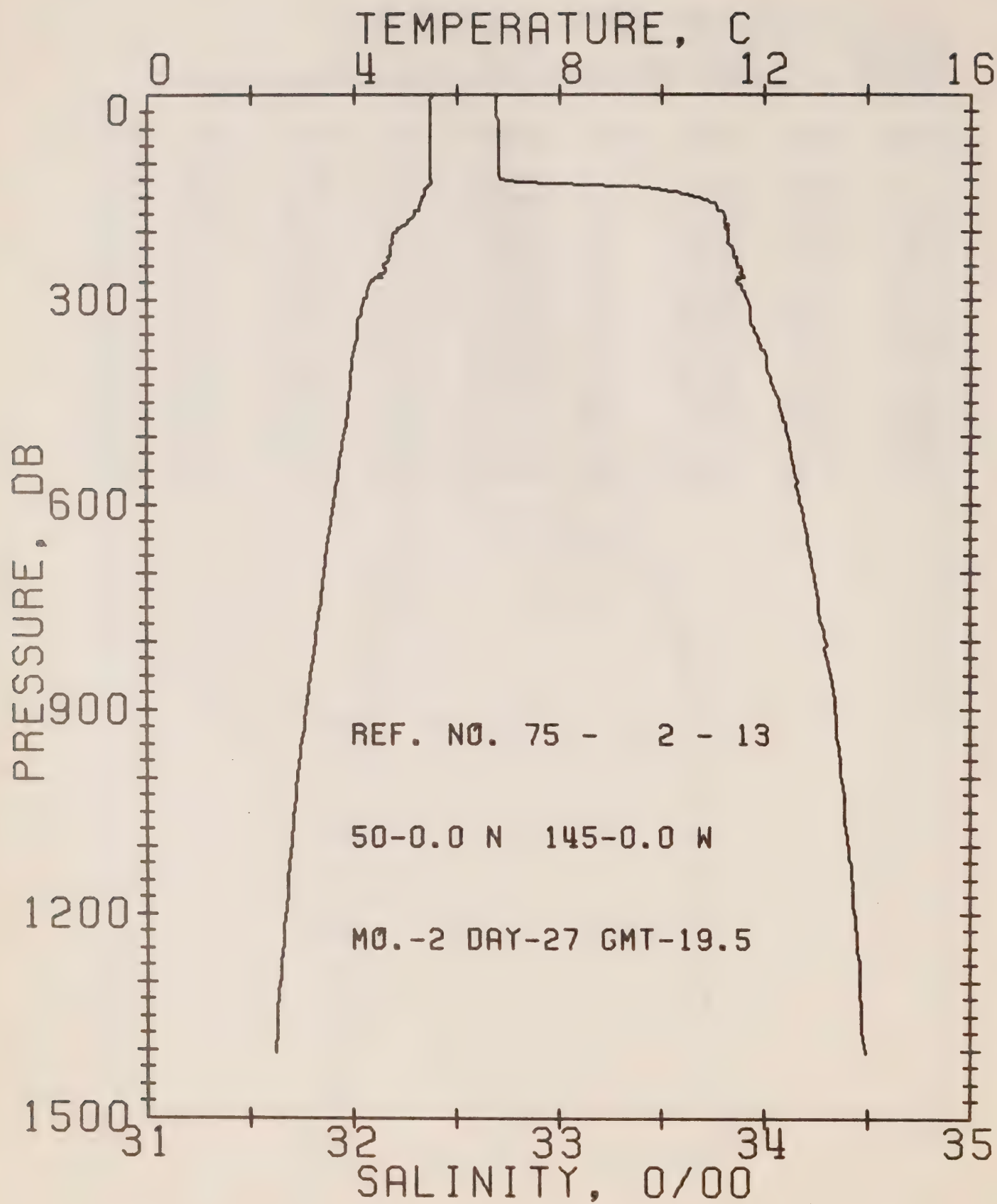
REFERENCE NO. 75- 2- 11

DATE 27/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 0.0

RESULTS OF STP CAST 142 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.44	32.68	0	25.81	219.3	0.0	0.0	1470.
10	5.44	32.68	10	25.81	219.6	0.22	0.01	1470.
20	5.44	32.68	20	25.81	219.7	0.44	0.04	1470.
30	5.44	32.68	30	25.81	219.9	0.66	0.10	1470.
50	5.44	32.68	50	25.82	219.9	1.10	0.28	1471.
75	5.44	32.69	75	25.82	219.6	1.65	0.63	1471.
100	5.44	32.69	99	25.82	219.8	2.20	1.12	1471.
125	5.47	32.73	124	25.85	217.5	2.75	1.75	1472.
150	5.35	33.69	149	26.62	144.5	3.14	2.31	1473.
175	5.16	33.79	174	26.72	135.1	3.49	2.88	1473.
200	4.76	33.81	199	26.78	129.4	3.83	3.52	1472.
225	4.62	33.82	223	26.81	127.4	4.15	4.21	1472.
250	4.63	33.87	248	26.85	123.9	4.46	4.97	1472.
300	4.36	33.89	298	26.89	120.0	5.07	6.68	1472.



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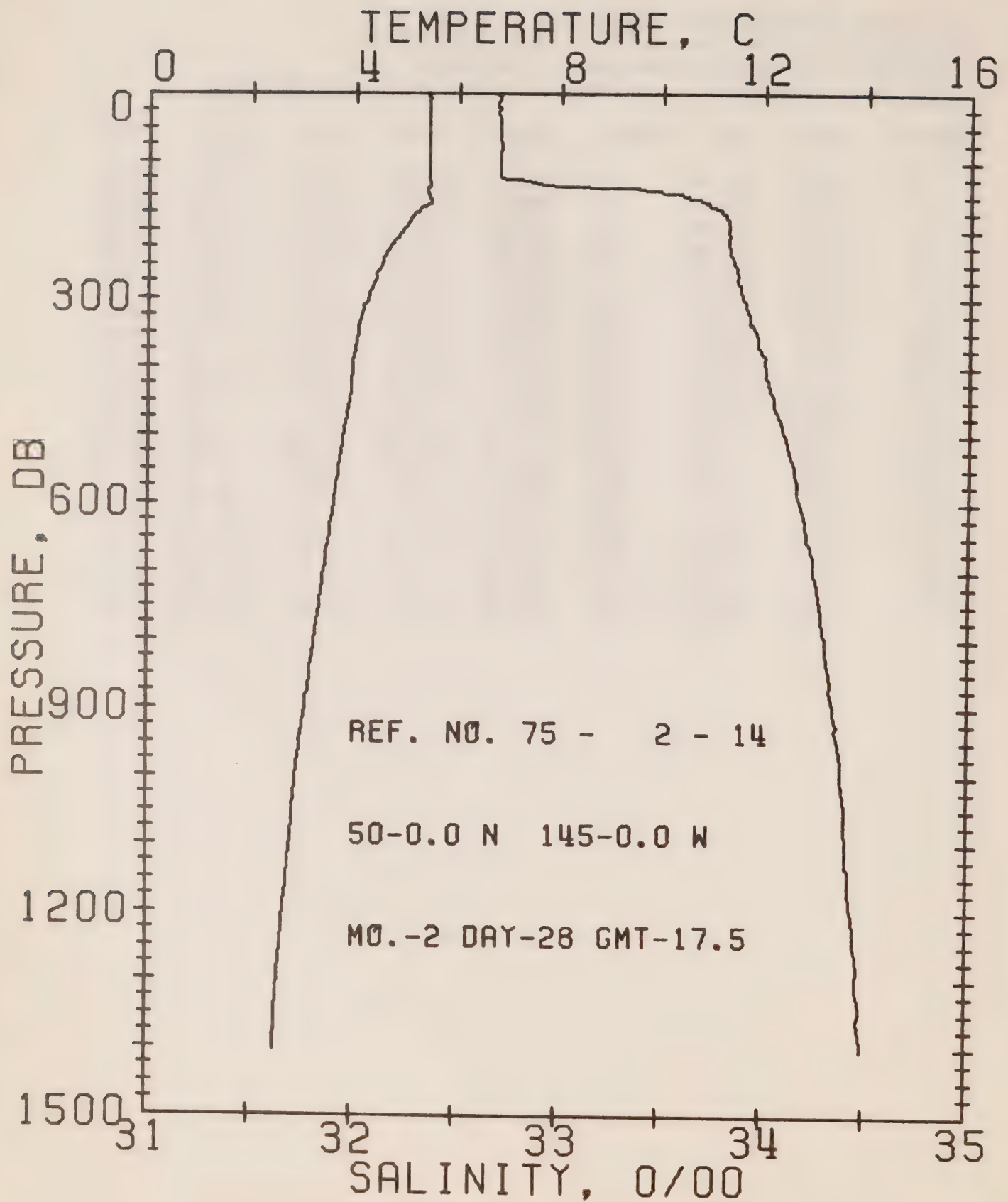
REFERENCE NO. 75- 2- 13

DATE 27/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 19.5

RESULTS OF STP CAST 280 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.48	32.70	0	25.82	218.3	0.0	0.0	1470.
10	5.46	32.69	10	25.82	219.2	0.22	0.01	1470.
20	5.46	32.69	20	25.82	219.2	0.44	0.04	1470.
30	5.46	32.69	30	25.82	219.3	0.66	0.10	1470.
50	5.46	32.70	50	25.83	218.8	1.10	0.28	1471.
75	5.46	32.70	75	25.83	219.0	1.64	0.63	1471.
100	5.46	32.70	99	25.83	219.3	2.19	1.12	1471.
125	5.48	32.74	124	25.86	216.7	2.74	1.74	1472.
150	5.33	33.67	149	26.61	145.8	3.16	2.34	1473.
175	5.16	33.80	174	26.73	134.3	3.51	2.91	1473.
200	4.81	33.82	199	26.79	129.2	3.84	3.54	1472.
225	4.69	33.84	223	26.82	126.6	4.15	4.24	1472.
250	4.57	33.87	248	26.85	123.3	4.48	4.99	1472.
300	4.20	33.91	298	26.93	116.6	5.08	6.68	1471.
400	3.94	34.01	397	27.03	107.4	6.19	10.66	1472.
500	3.79	34.11	496	27.13	99.0	7.23	15.38	1473.
600	3.59	34.17	595	27.19	93.1	8.19	20.76	1474.
800	3.24	34.30	793	27.33	81.7	9.93	33.19	1476.
1000	2.90	34.37	990	27.42	73.7	11.48	47.35	1478.
1200	2.67	34.44	1188	27.49	67.5	12.89	63.13	1480.



OFFSHORE OCEANOGRAPHY GROUP

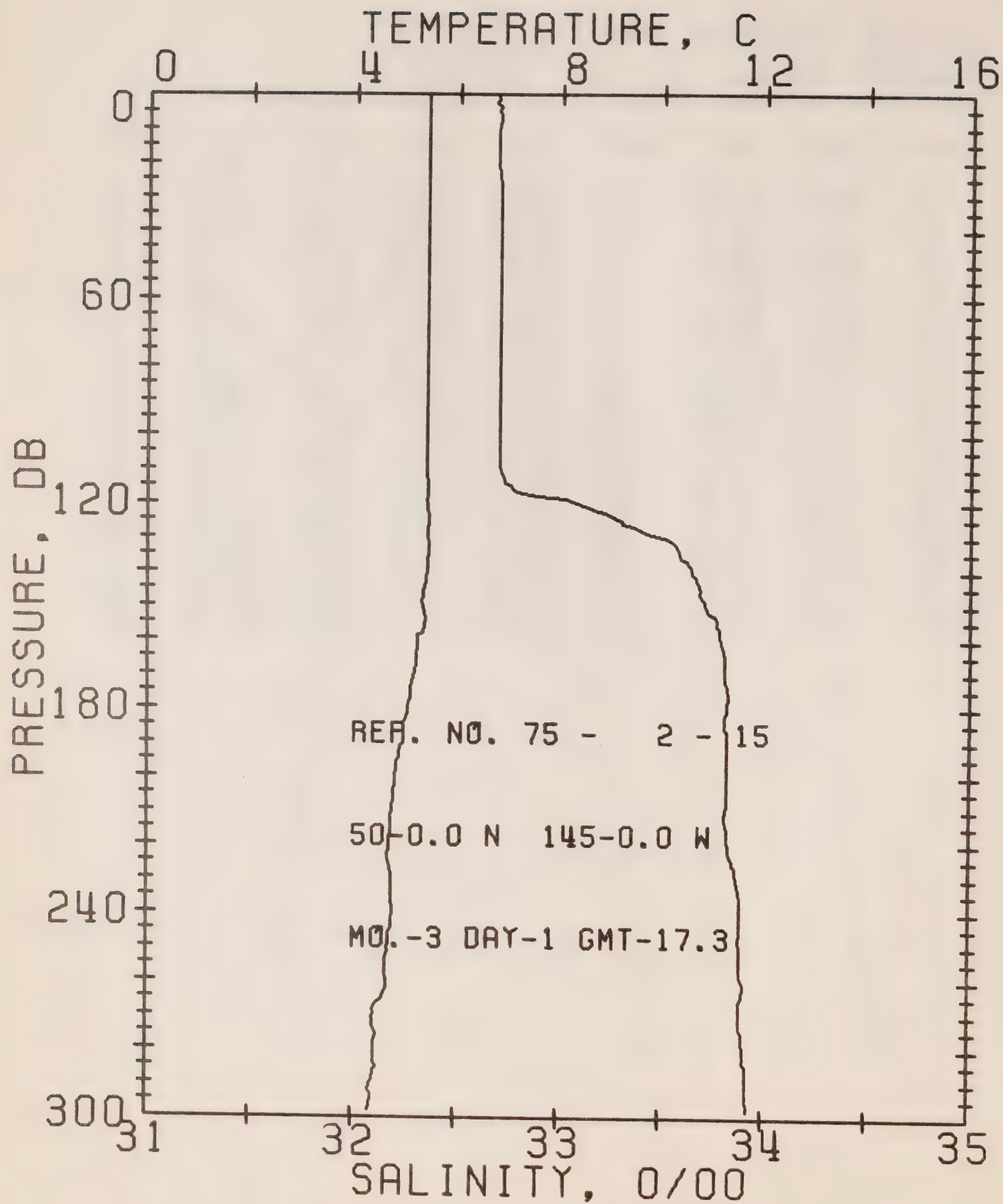
REFERENCE NO. 75- 2- 14

DATE 28/ 2/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 277 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.40	32.69	0	25.83	218.2	0.0	0.0	1470.
10	5.41	32.70	10	25.83	217.8	0.22	0.01	1470.
20	5.41	32.70	20	25.83	217.9	0.44	0.04	1470.
30	5.41	32.69	30	25.82	218.8	0.65	0.10	1470.
50	5.41	32.70	50	25.83	218.2	1.09	0.23	1470.
75	5.41	32.71	75	25.84	217.8	1.64	0.63	1471.
100	5.41	32.70	99	25.83	218.7	2.18	1.11	1471.
125	5.42	32.74	124	25.86	216.1	2.73	1.74	1472.
150	5.42	33.61	149	26.55	151.3	3.18	2.37	1473.
175	5.16	33.80	174	26.73	134.3	3.54	2.96	1473.
200	4.93	33.82	199	26.77	130.5	3.87	3.59	1472.
225	4.67	33.83	223	26.81	127.4	4.19	4.29	1472.
250	4.51	33.85	248	26.84	124.1	4.51	5.05	1472.
300	4.25	33.89	298	26.90	118.7	5.11	6.75	1471.
400	3.94	34.01	397	27.03	107.8	6.24	10.75	1472.
500	3.78	34.10	496	27.12	99.6	7.28	15.52	1473.
600	3.59	34.18	595	27.20	92.9	8.24	20.90	1474.
800	3.23	34.30	793	27.33	81.3	9.97	33.24	1476.
1000	2.89	34.38	990	27.42	73.0	11.51	47.34	1478.
1200	2.65	34.44	1188	27.49	67.3	12.92	63.08	1480.



OFFSHORE OCEANOGRAPHY GROUP

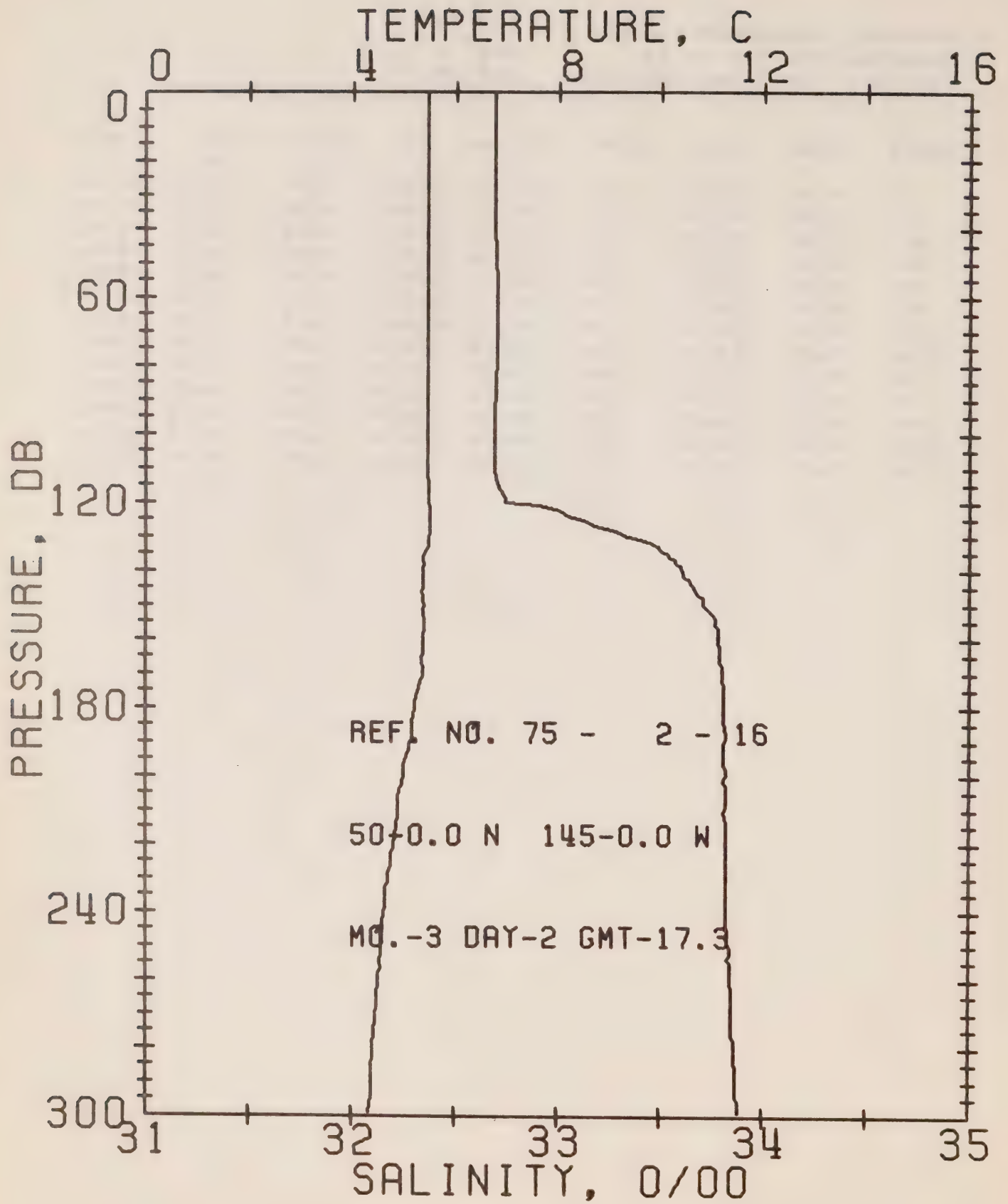
REFERENCE NO. 75- 2- 15

DATE 1/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 155 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.39	32.69	0	25.83	218.1	0.0	0.0	1470.
10	5.38	32.69	10	25.83	218.0	0.22	0.01	1470.
20	5.38	32.69	20	25.83	218.4	0.44	0.04	1470.
30	5.38	32.70	30	25.84	217.7	0.65	0.10	1470.
50	5.38	32.70	50	25.84	217.9	1.09	0.28	1470.
75	5.39	32.70	75	25.83	218.3	1.63	0.62	1471.
100	5.40	32.70	99	25.83	218.6	2.18	1.11	1471.
125	5.43	33.30	124	26.30	174.3	2.70	1.71	1473.
150	5.33	33.71	149	26.64	142.8	3.08	2.24	1473.
175	5.10	33.82	174	26.76	131.9	3.42	2.80	1473.
200	4.79	33.82	199	26.79	128.9	3.75	3.43	1472.
225	4.70	33.85	223	26.82	126.0	4.07	4.12	1472.
250	4.67	33.89	248	26.86	122.9	4.38	4.87	1472.



OFFSHORE OCEANOGRAPHY GROUP

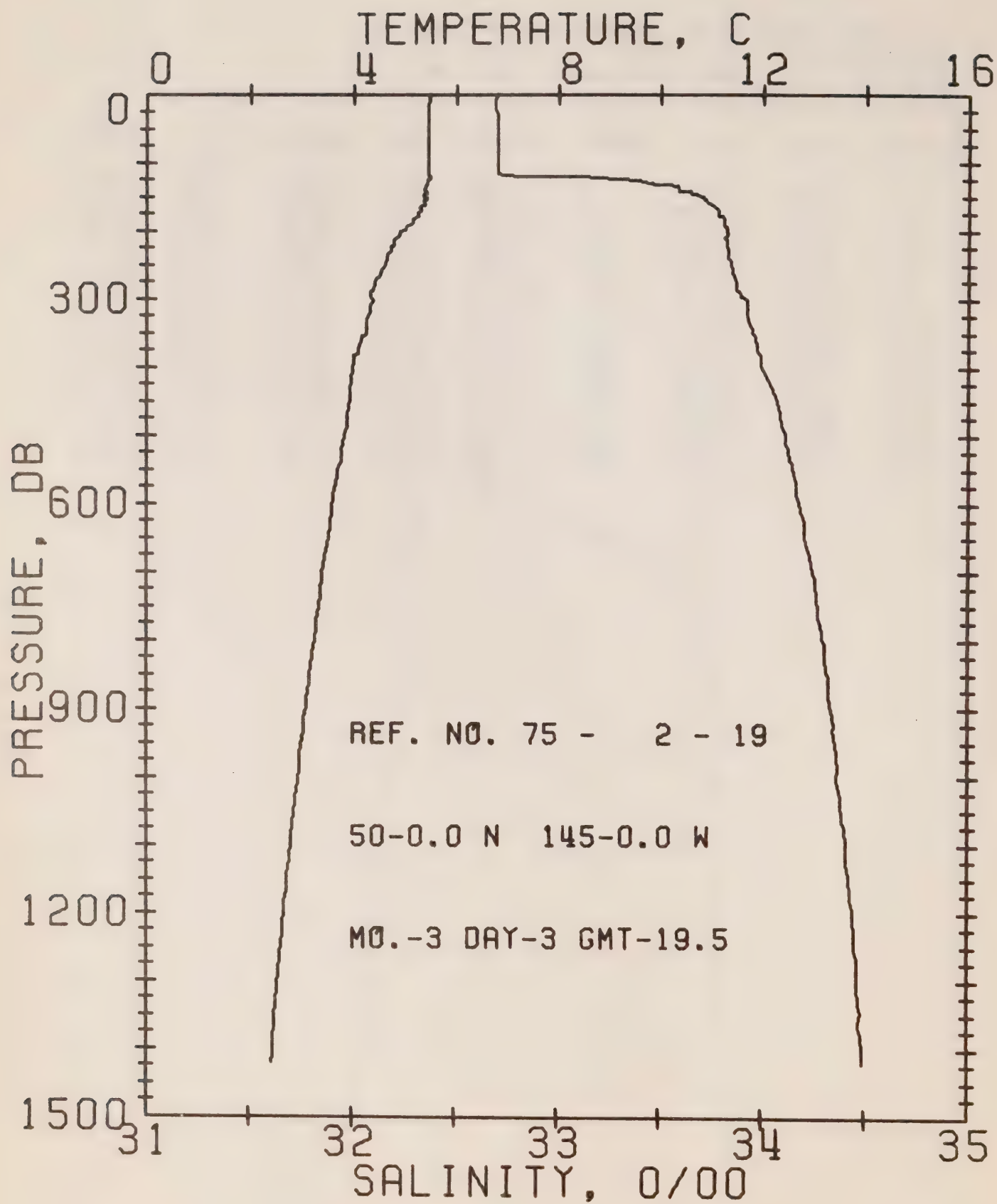
REFERENCE NO. 75- 2- 16

DATE 2/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STD CAST 141 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.44	32.69	0	25.82	218.6	0.0	0.0	1470.
10	5.44	32.69	10	25.82	218.9	0.22	0.01	1470.
20	5.44	32.69	20	25.82	219.0	0.44	0.04	1470.
30	5.44	32.69	30	25.82	219.1	0.66	0.10	1470.
50	5.45	32.70	50	25.83	219.0	1.10	0.28	1471.
75	5.45	32.70	75	25.83	218.9	1.64	0.63	1471.
100	5.45	32.69	99	25.82	219.9	2.19	1.12	1471.
125	5.49	33.13	124	26.16	187.7	2.73	1.73	1473.
150	5.38	33.71	149	26.63	143.4	3.12	2.28	1473.
175	5.24	33.81	174	26.73	134.6	3.47	2.85	1473.
200	4.98	33.82	199	26.77	131.1	3.80	3.49	1473.
225	4.75	33.82	223	26.79	128.8	4.13	4.19	1472.
250	4.55	33.83	248	26.83	125.7	4.44	4.97	1472.



OFFSHORE OCEANOGRAPHY GROUP

REFERENCE NO. 75- 2- 19

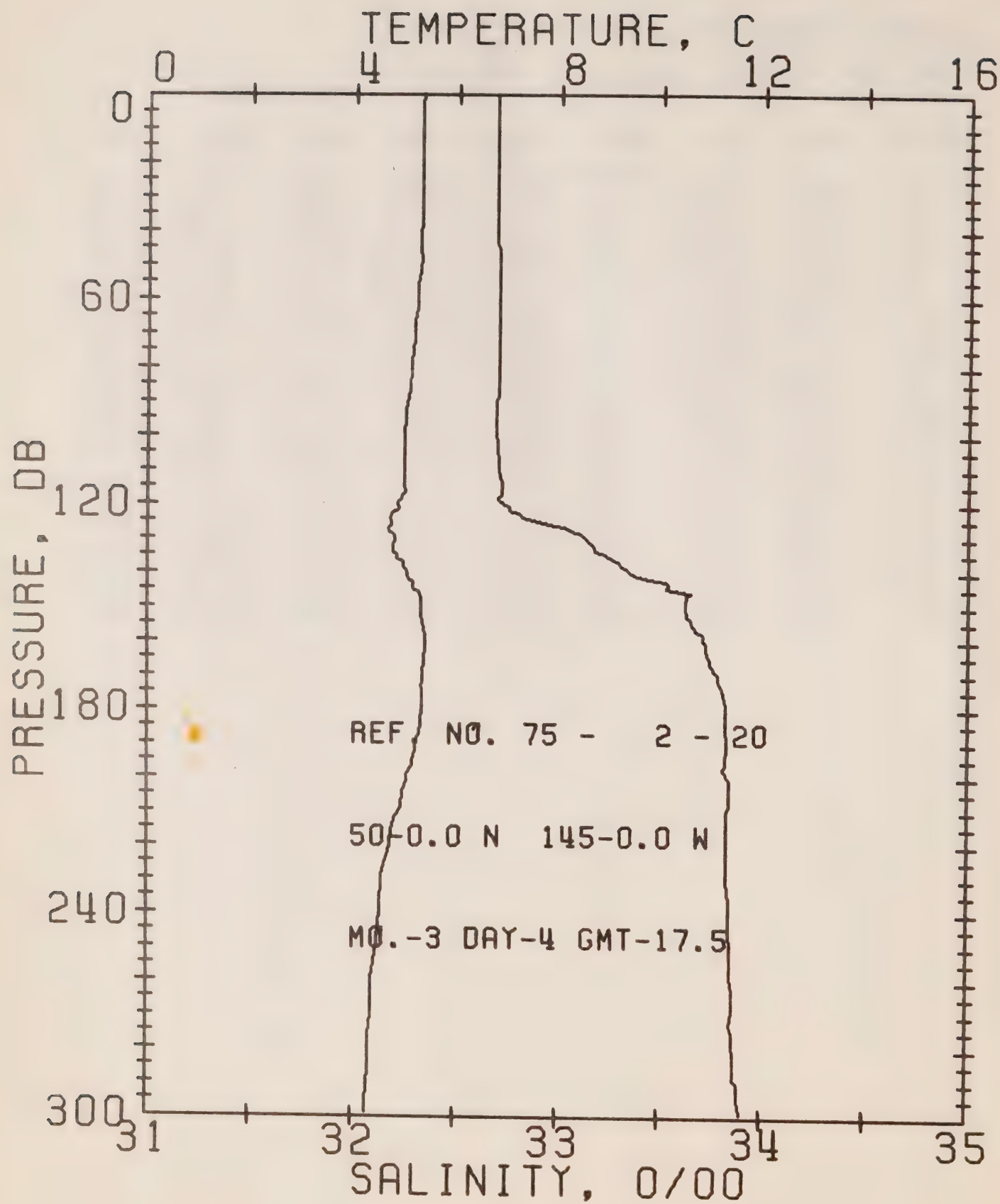
DATE 3/ 3/75

POSITION 50- 0.0N, 145- 0.0W

GMT 19.5

RESULTS OF STP CAST 265 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.46	32.70	0	25.83	218.1	0.0	0.0	1470.
10	5.45	32.69	10	25.82	219.0	0.22	0.01	1470.
20	5.44	32.69	20	25.82	219.0	0.44	0.04	1470.
30	5.43	32.70	30	25.83	218.2	0.66	0.10	1470.
50	5.43	32.70	50	25.83	218.4	1.09	0.28	1471.
75	5.43	32.70	75	25.83	218.7	1.64	0.63	1471.
100	5.44	32.70	99	25.83	219.1	2.19	1.11	1471.
125	5.44	33.34	124	26.34	171.1	2.71	1.72	1473.
150	5.39	33.70	149	26.62	144.2	3.10	2.26	1473.
175	5.25	33.78	174	26.70	136.9	3.45	2.83	1473.
200	4.92	33.82	199	26.77	130.4	3.78	3.47	1472.
225	4.72	33.82	223	26.80	128.1	4.11	4.17	1472.
250	4.59	33.84	248	26.83	125.8	4.42	4.94	1472.
300	4.37	33.92	298	26.91	117.9	5.03	6.65	1472.
400	3.97	33.99	397	27.01	109.1	6.17	10.70	1472.
500	3.82	34.11	496	27.12	99.5	7.21	15.45	1473.
600	3.59	34.17	595	27.20	93.0	8.17	20.84	1474.
800	3.24	34.29	793	27.32	81.8	9.91	33.24	1476.
1000	2.94	34.36	990	27.40	75.0	11.47	47.49	1478.
1200	2.66	34.44	1188	27.49	67.2	12.88	63.32	1480.



OFFSHORE OCEANOGRAPHY GROUP

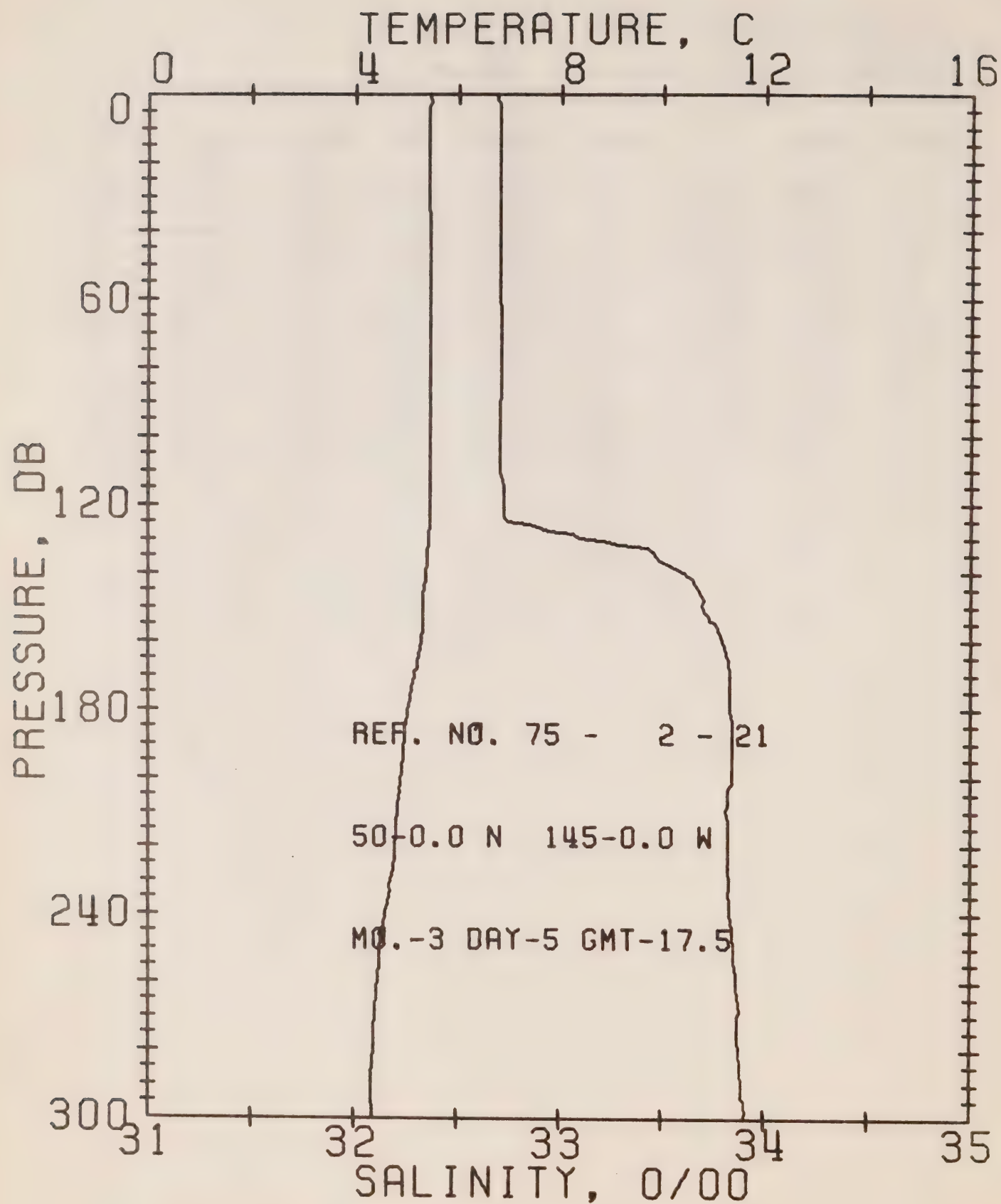
REFERENCE NO. 75- 2- 20

DATE 4/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STD CAST 153 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.30	32.69	0	25.84	217.1	0.0	0.0	1469.
10	5.28	32.69	10	25.84	217.2	0.22	0.01	1469.
20	5.28	32.69	20	25.84	217.3	0.43	0.04	1469.
30	5.28	32.69	30	25.84	217.4	0.65	0.10	1470.
50	5.24	32.70	50	25.85	216.4	1.09	0.28	1470.
75	5.11	32.70	75	25.87	215.2	1.63	0.62	1470.
100	4.97	32.69	99	25.88	214.6	2.16	1.10	1469.
125	4.72	32.90	124	26.07	196.5	2.69	1.71	1469.
150	5.30	33.62	149	26.57	149.1	3.11	2.29	1473.
175	5.34	33.80	174	26.71	136.0	3.47	2.88	1474.
200	5.03	33.83	199	26.77	131.0	3.80	3.52	1473.
225	4.63	33.83	223	26.81	126.8	4.13	4.22	1472.
250	4.46	33.85	248	26.85	123.8	4.44	4.98	1471.



OFFSHORE OCEANOGRAPHY GROUP

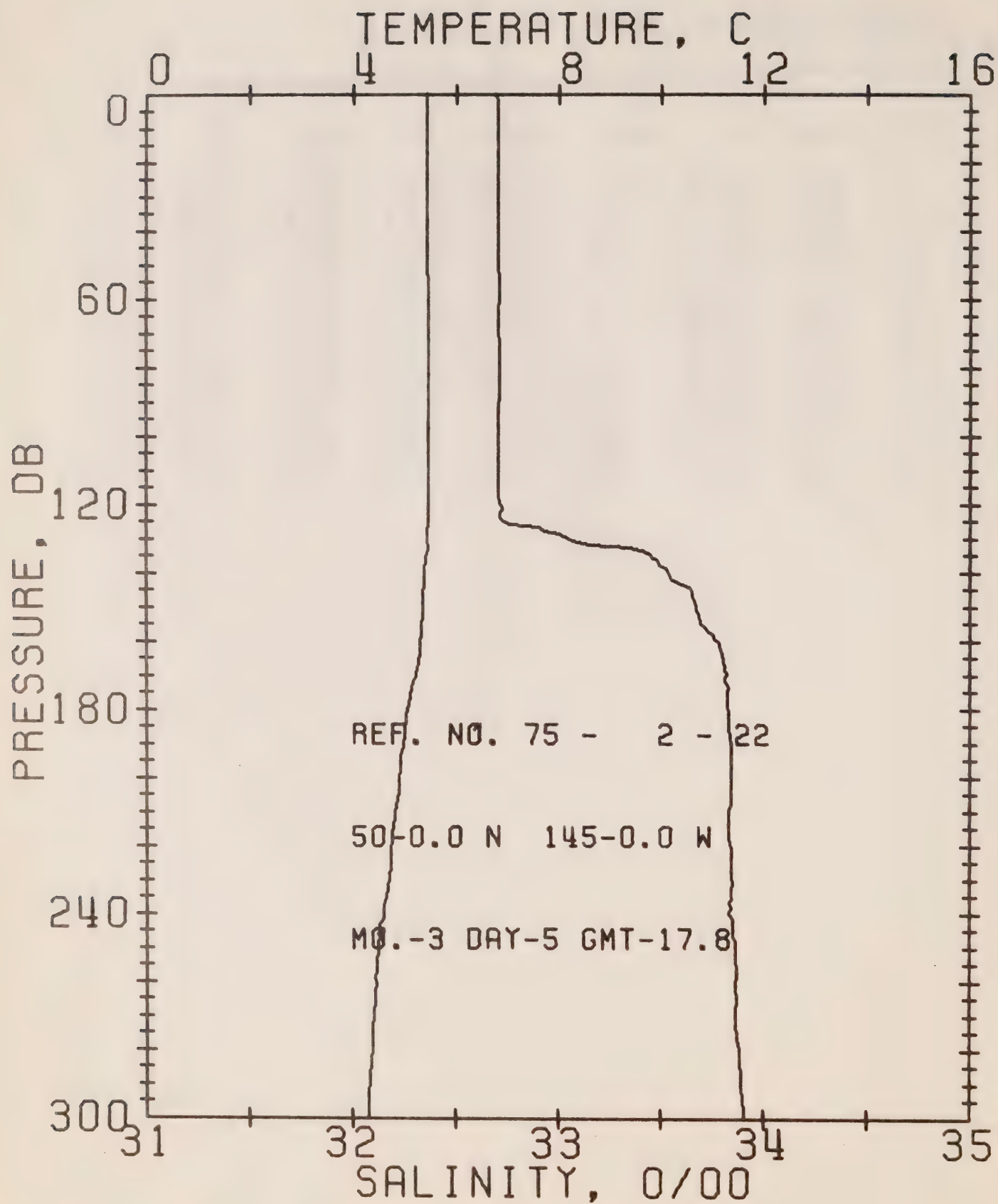
REFERENCE NO. 75- 2- 21

DATE 5/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 127 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.44	32.69	0	25.82	218.6	0.0	0.0	1470.
10	5.41	32.70	10	25.83	217.8	0.22	0.01	1470.
20	5.42	32.70	20	25.83	218.0	0.44	0.04	1470.
30	5.42	32.70	30	25.83	218.1	0.65	0.10	1470.
50	5.43	32.70	50	25.83	218.4	1.09	0.28	1471.
75	5.44	32.71	75	25.84	218.0	1.64	0.63	1471.
100	5.44	32.70	99	25.83	219.1	2.18	1.11	1471.
125	5.43	32.74	124	25.86	216.2	2.73	1.74	1472.
150	5.32	33.69	149	26.63	144.1	3.14	2.31	1473.
175	5.08	33.83	174	26.76	131.2	3.48	2.87	1473.
200	4.88	33.84	199	26.79	128.4	3.80	3.49	1472.
225	4.75	33.82	223	26.79	128.8	4.13	4.19	1472.
250	4.49	33.85	248	26.84	124.0	4.44	4.96	1471.
300	4.34	33.90	298	26.90	119.1	5.05	6.66	1472.



OFFSHORE OCEANOGRAPHY GROUP

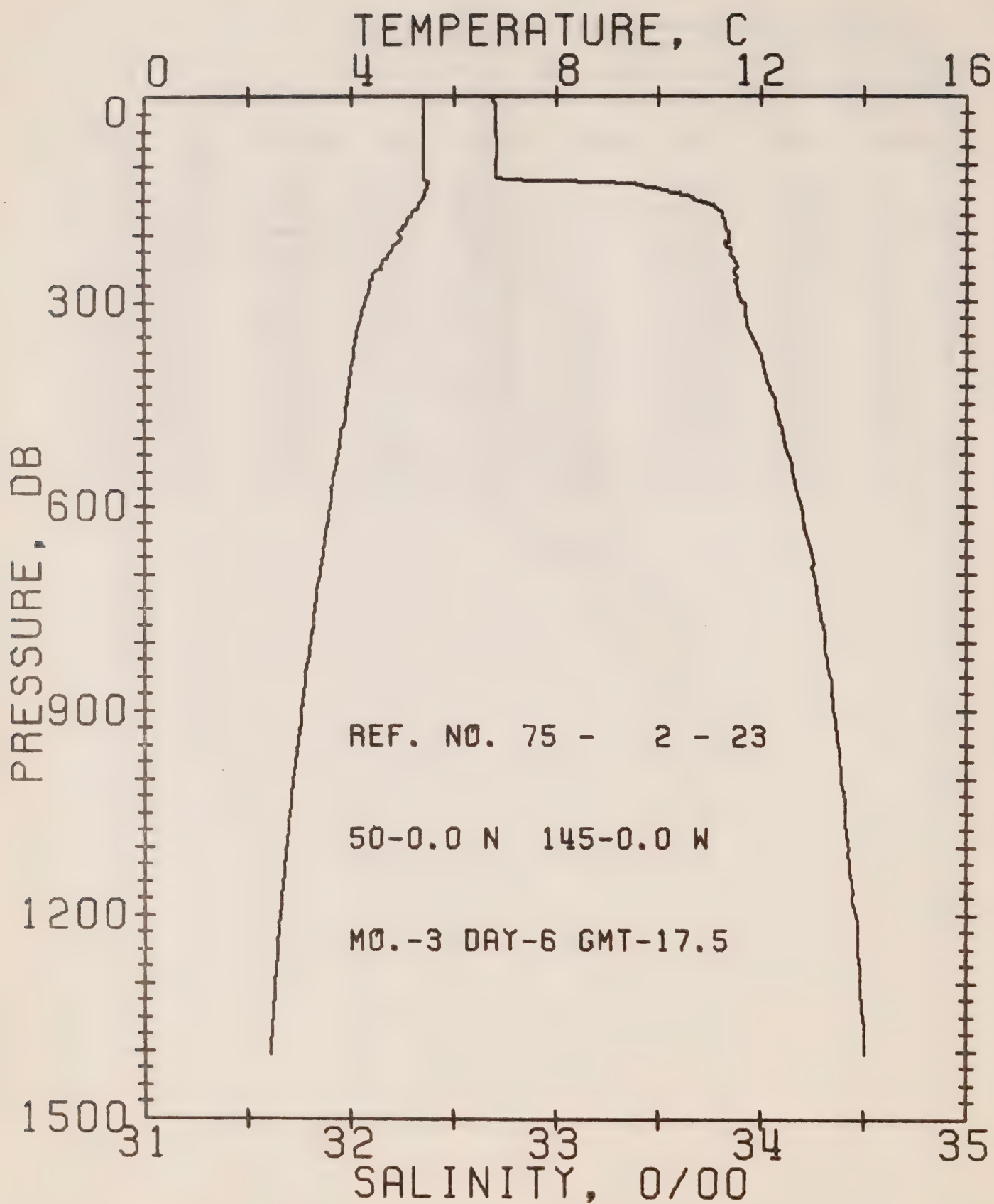
REFERENCE NO. 75- 2- 22

DATE 5/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 126 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.41	32.69	0	25.82	218.2	0.0	0.0	1470.
10	5.41	32.70	10	25.83	217.8	0.22	0.01	1470.
20	5.41	32.70	20	25.83	217.9	0.44	0.04	1470.
30	5.42	32.70	30	25.83	218.1	0.65	0.10	1470.
50	5.42	32.70	50	25.83	218.2	1.09	0.28	1470.
75	5.43	32.71	75	25.84	217.9	1.64	0.63	1471.
100	5.43	32.70	99	25.83	218.8	2.18	1.11	1471.
125	5.44	32.73	124	25.85	217.1	2.73	1.74	1472.
150	5.33	33.67	149	26.61	145.8	3.15	2.33	1473.
175	5.10	33.82	174	26.75	132.2	3.49	2.90	1473.
200	4.89	33.84	199	26.79	128.6	3.82	3.52	1472.
225	4.72	33.84	223	26.81	127.0	4.14	4.21	1472.
250	4.47	33.86	248	26.86	123.0	4.45	4.97	1471.
300	4.30	33.90	298	26.91	118.6	5.06	6.67	1472.



OFFSHORE OCEANOGRAPHY GROUP

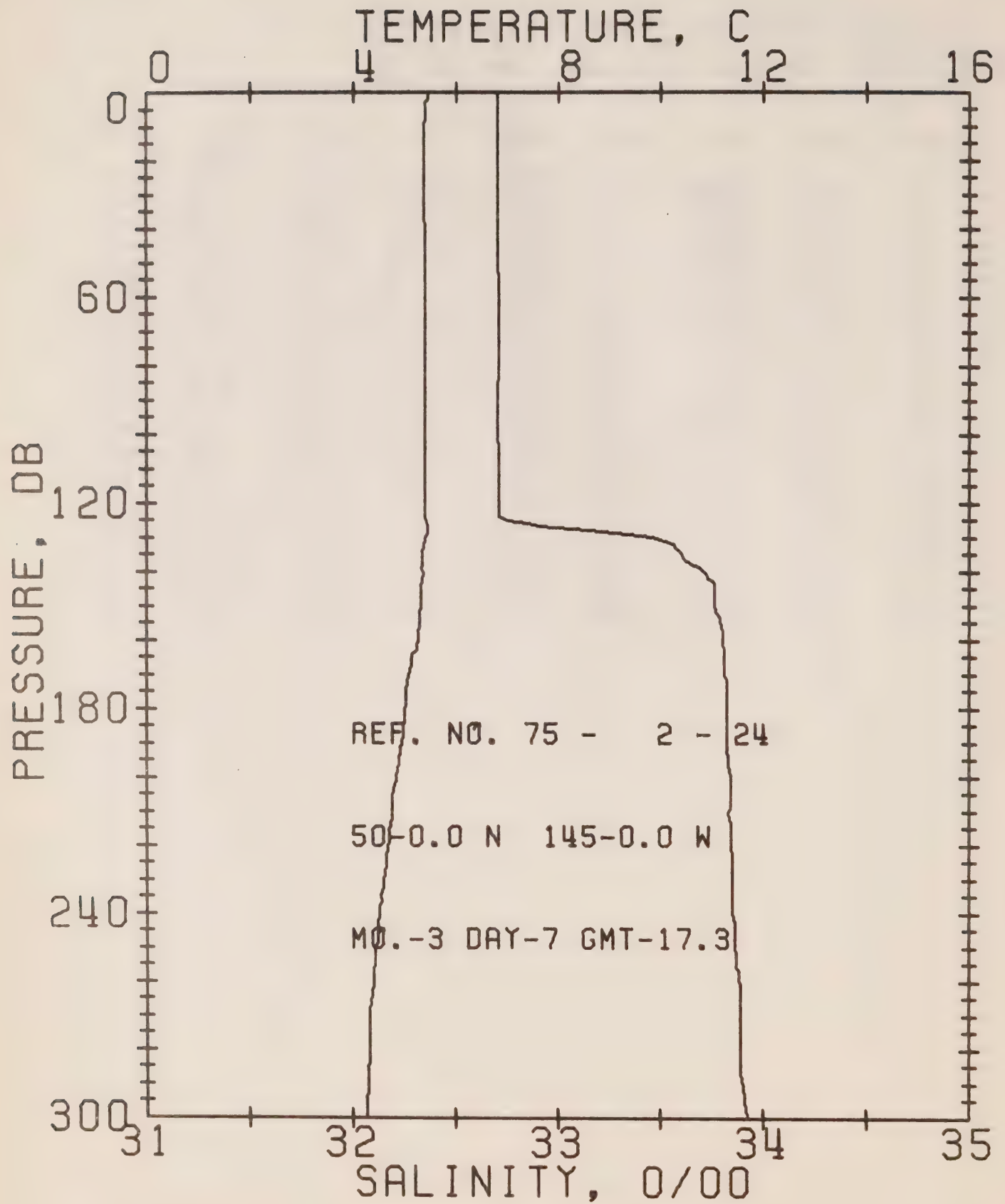
REFERENCE NO. 75- 2- 23

DATE 6/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 240 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.40	32.68	0	25.82	218.9	0.0	0.0	1470.
10	5.38	32.70	10	25.84	217.5	0.22	0.01	1470.
20	5.38	32.70	20	25.84	217.6	0.44	0.04	1470.
30	5.38	32.70	30	25.84	217.7	0.65	0.10	1470.
50	5.38	32.70	50	25.84	217.9	1.09	0.28	1470.
75	5.38	32.71	75	25.84	217.4	1.63	0.62	1471.
100	5.39	32.70	99	25.84	218.3	2.18	1.11	1471.
125	5.48	33.13	124	26.16	187.6	2.72	1.73	1473.
150	5.40	33.66	149	26.59	147.3	3.12	2.28	1473.
175	5.14	33.81	174	26.74	133.3	3.46	2.86	1473.
200	4.91	33.84	199	26.79	128.8	3.79	3.48	1472.
225	4.76	33.85	223	26.82	126.7	4.11	4.18	1472.
250	4.55	33.88	248	26.86	122.4	4.42	4.93	1472.
300	4.25	33.90	298	26.91	118.2	5.03	6.62	1471.
400	3.97	34.01	397	27.03	107.5	6.15	10.63	1472.
500	3.77	34.11	496	27.12	99.3	7.19	15.36	1473.
600	3.56	34.19	595	27.21	91.5	8.14	20.70	1474.
800	3.19	34.31	793	27.34	80.1	9.85	32.86	1476.
1000	2.86	34.39	990	27.44	71.9	11.36	46.74	1478.
1200	2.61	34.46	1188	27.51	65.1	12.74	62.11	1480.



OFFSHORE OCEANOGRAPHY GROUP

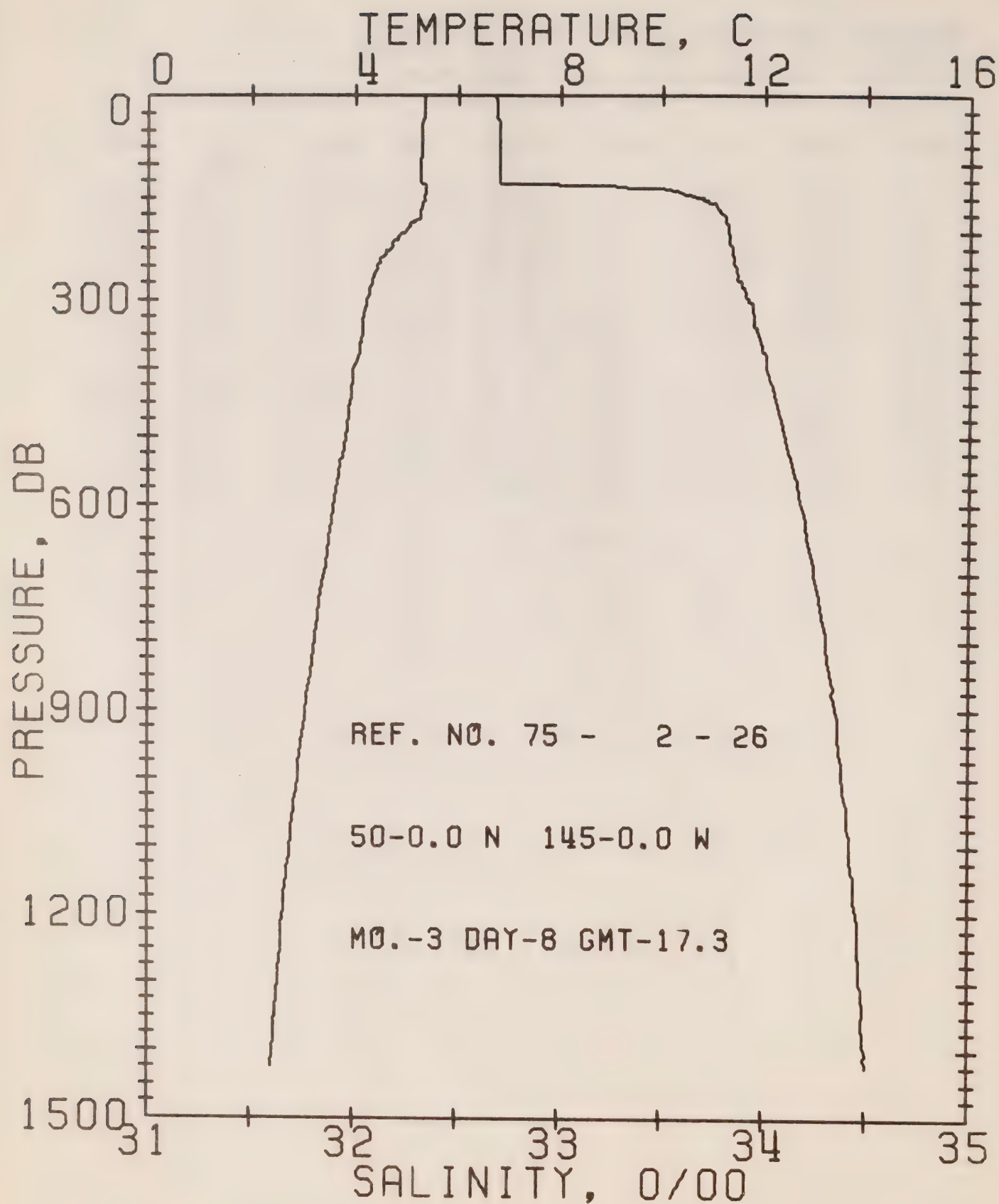
REFERENCE NO. 75- 2- 24

DATE 7/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 125 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.43	32.70	0	25.83	217.7	0.0	0.0	1470.
10	5.37	32.70	10	25.84	217.5	0.22	0.01	1470.
20	5.37	32.70	20	25.84	217.5	0.44	0.04	1470.
30	5.37	32.70	30	25.84	217.6	0.65	0.10	1470.
50	5.38	32.70	50	25.84	217.8	1.09	0.28	1470.
75	5.39	32.71	75	25.84	217.5	1.63	0.62	1471.
100	5.39	32.70	99	25.84	218.3	2.18	1.11	1471.
125	5.42	32.75	124	25.87	215.4	2.72	1.73	1472.
150	5.30	33.76	149	26.68	138.6	3.11	2.27	1473.
175	5.02	33.82	174	26.76	131.2	3.44	2.83	1472.
200	4.83	33.84	199	26.80	127.9	3.77	3.45	1472.
225	4.63	33.85	223	26.83	125.2	4.09	4.14	1472.
250	4.44	33.86	248	26.86	122.7	4.40	4.89	1471.
300	4.27	33.92	298	26.92	116.8	4.99	6.56	1471.



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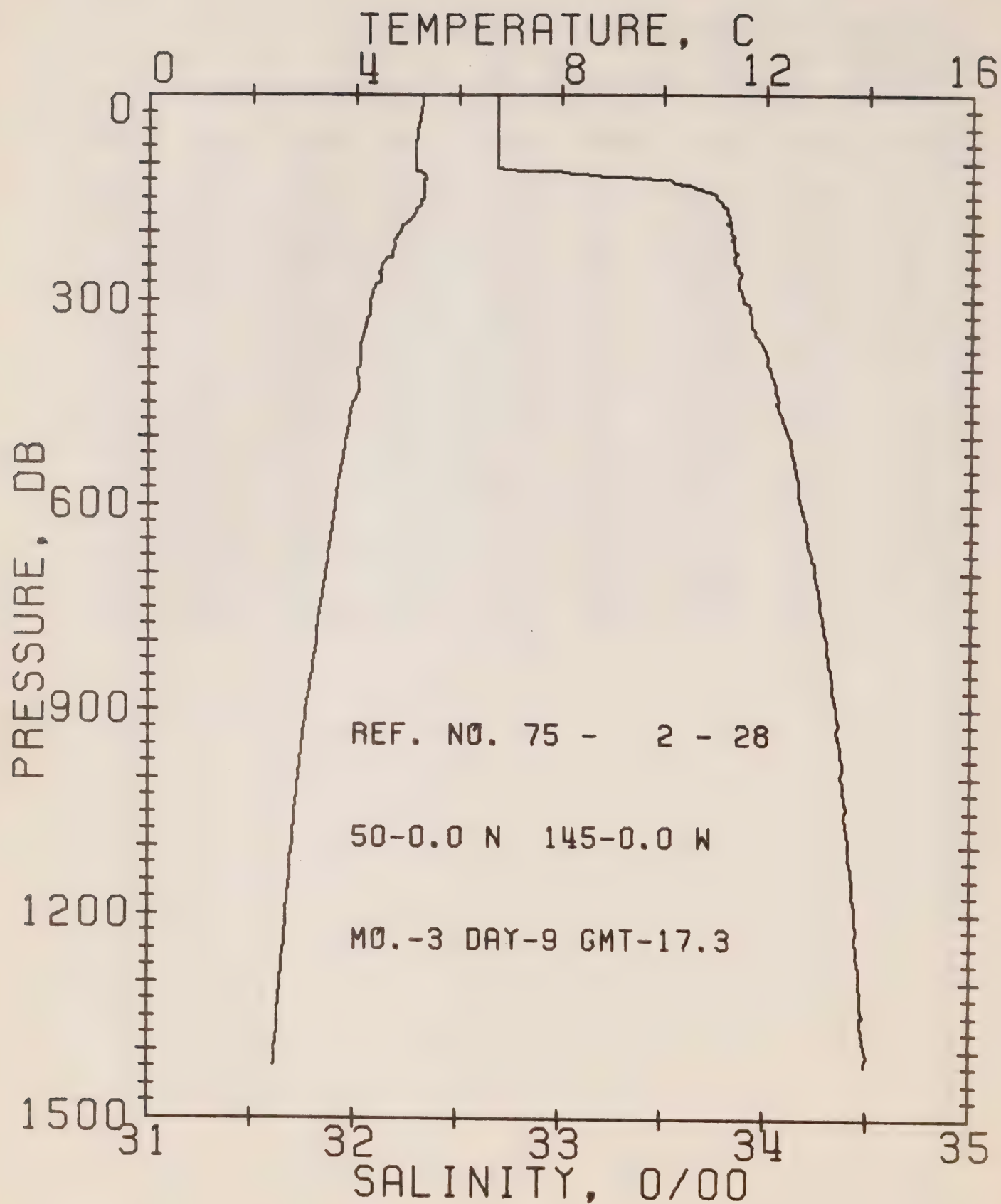
REFERENCE NO. 75- 2- 26

DATE 8/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 232 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.33	32.68	0	25.83	218.2	0.0	0.0	1469.
10	5.34	32.69	10	25.83	217.8	0.22	0.01	1469.
20	5.34	32.69	20	25.83	217.9	0.44	0.04	1470.
30	5.33	32.69	30	25.83	217.9	0.65	0.10	1470.
50	5.28	32.70	50	25.85	216.8	1.09	0.28	1470.
75	5.27	32.70	75	25.85	216.9	1.63	0.62	1470.
100	5.26	32.70	99	25.85	217.1	2.17	1.11	1471.
125	5.26	32.70	124	25.85	217.3	2.72	1.73	1471.
150	5.33	33.67	149	26.61	145.8	3.14	2.32	1473.
175	5.25	33.80	174	26.72	135.6	3.49	2.90	1473.
200	4.96	33.82	199	26.77	130.8	3.82	3.53	1473.
225	4.67	33.84	223	26.82	126.4	4.14	4.23	1472.
250	4.44	33.86	248	26.86	122.9	4.45	4.98	1471.
300	4.22	33.92	298	26.93	116.3	5.05	6.66	1471.
400	3.96	34.01	397	27.03	107.7	6.17	10.63	1472.
500	3.81	34.10	496	27.12	100.1	7.21	15.39	1473.
600	3.58	34.18	595	27.20	92.4	8.17	20.77	1474.
800	3.21	34.30	793	27.33	81.1	9.90	33.08	1476.
1000	2.89	34.38	990	27.43	72.8	11.43	47.10	1478.
1200	2.62	34.45	1188	27.51	65.6	12.81	62.57	1480.



OFFSHORE OCEANOGRAPHY GROUP

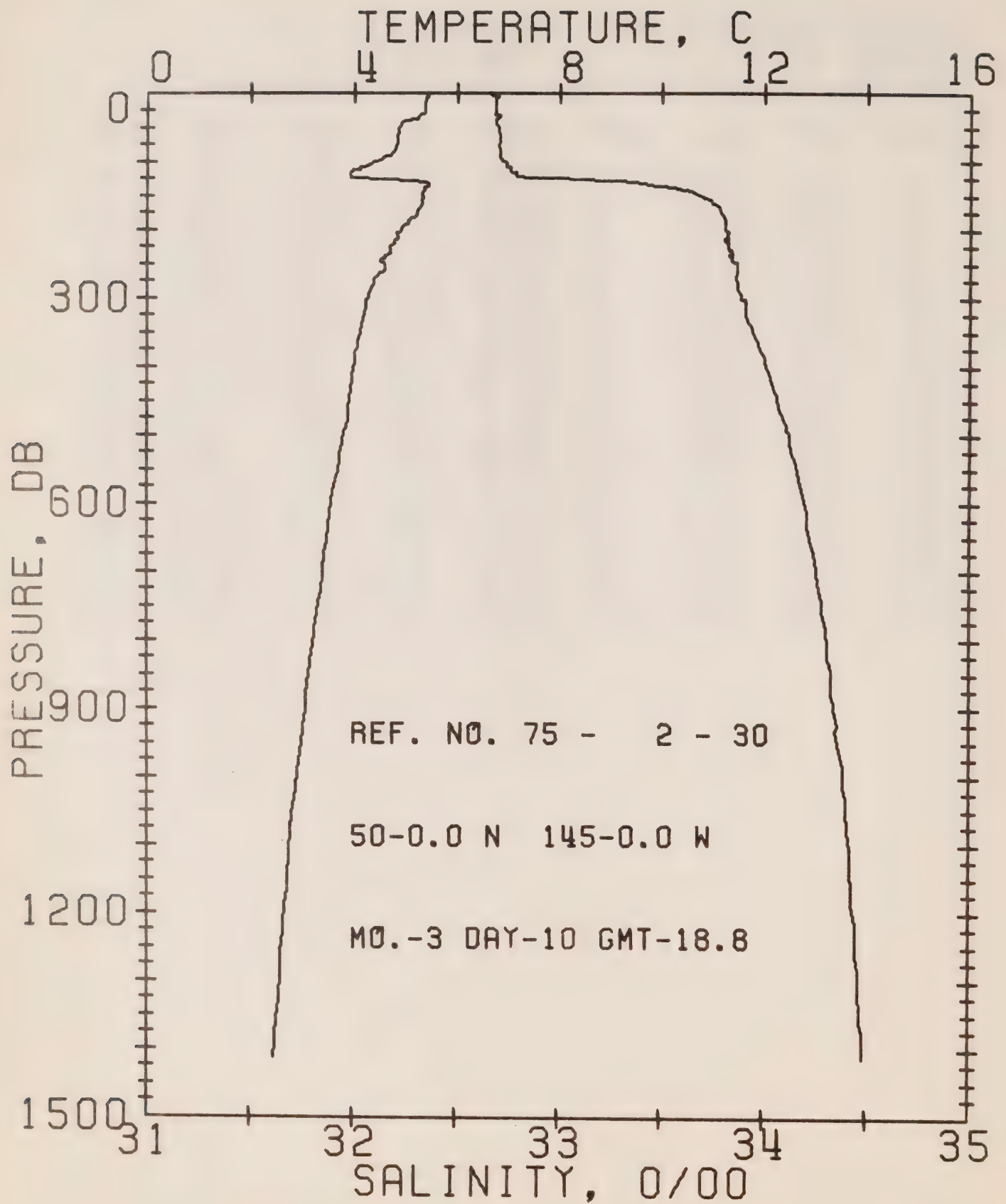
REFERENCE NO. 75- 2- 28

DATE 9/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 257 FCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.27	32.69	0	25.84	216.7	0.0	0.0	1469.
10	5.27	32.69	10	25.84	217.0	0.22	0.01	1469.
20	5.25	32.69	20	25.84	216.9	0.43	0.04	1469.
30	5.23	32.69	30	25.85	216.8	0.65	0.10	1469.
50	5.17	32.69	50	25.85	216.4	1.08	0.28	1469.
75	5.14	32.69	75	25.86	216.3	1.62	0.62	1470.
100	5.14	32.69	99	25.86	216.5	2.17	1.10	1470.
125	5.30	33.54	124	26.51	154.9	2.66	1.56	1472.
150	5.30	33.75	149	26.68	139.5	3.02	2.17	1473.
175	5.11	33.81	174	26.75	132.8	3.36	2.73	1473.
200	4.86	33.83	199	26.79	129.0	3.69	3.36	1472.
225	4.71	33.84	223	26.81	126.8	4.01	4.05	1472.
250	4.48	33.86	248	26.85	123.1	4.32	4.81	1471.
300	4.28	33.89	298	26.90	119.1	4.93	6.51	1471.
400	4.03	34.02	397	27.03	107.7	6.06	10.54	1472.
500	3.81	34.11	496	27.12	99.2	7.10	15.30	1473.
600	3.59	34.17	595	27.19	93.1	8.06	20.67	1474.
800	3.24	34.30	793	27.33	81.4	9.80	33.06	1476.
1000	2.90	34.37	990	27.42	73.6	11.34	47.13	1478.
1200	2.67	34.44	1188	27.49	67.3	12.74	62.87	1480.



OFFSHORE OCEANOGRAPHY GROUP

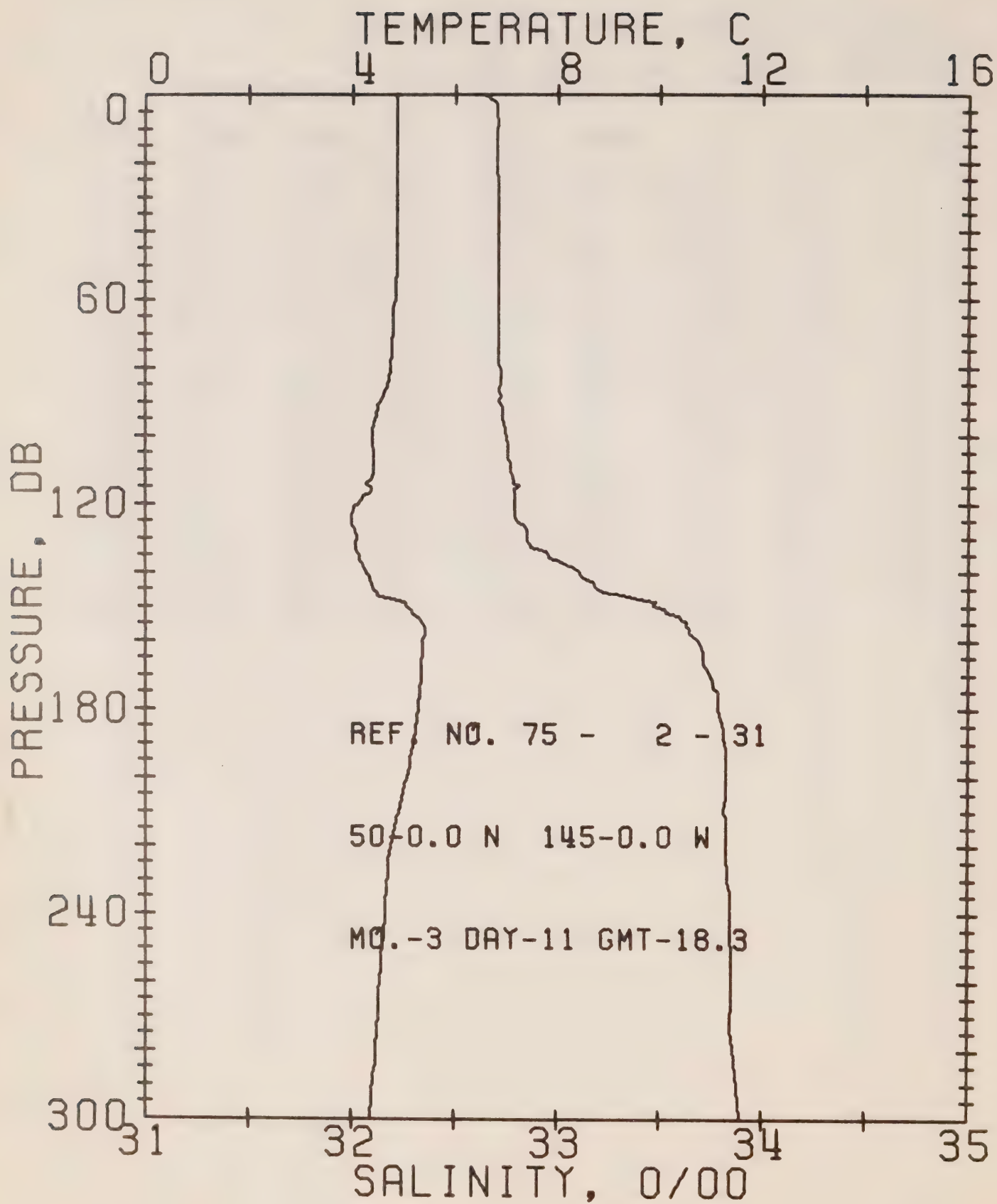
REFERENCE NO. 75- 2- 30

DATE 10/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 18.8

RESULTS OF STD CAST 248 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.42	32.66	0	25.80	220.6	0.0	0.0	1470.
10	5.39	32.69	10	25.83	218.4	0.22	0.01	1470.
20	5.35	32.69	20	25.83	218.0	0.44	0.04	1470.
30	5.31	32.69	30	25.84	217.7	0.66	0.10	1470.
50	4.85	32.70	50	25.90	212.2	1.08	0.28	1468.
75	4.81	32.70	75	25.90	211.7	1.61	0.61	1468.
100	4.39	32.72	99	25.96	206.0	2.14	1.08	1467.
125	4.56	33.15	124	26.28	176.1	2.64	1.65	1469.
150	5.32	33.68	149	26.62	144.6	3.03	2.20	1473.
175	5.21	33.79	174	26.72	135.6	3.38	2.78	1473.
200	4.89	33.81	199	26.77	130.6	3.71	3.41	1472.
225	4.69	33.82	223	26.80	128.1	4.04	4.11	1472.
250	4.56	33.87	248	26.85	123.2	4.35	4.87	1472.
300	4.25	33.89	298	26.90	118.8	4.96	6.58	1471.
400	3.97	34.01	397	27.03	107.8	6.09	10.61	1472.
500	3.77	34.12	496	27.13	98.2	7.12	15.34	1473.
600	3.54	34.20	595	27.22	90.7	8.07	20.64	1474.
800	3.21	34.31	793	27.34	80.5	9.79	32.84	1476.
1000	2.90	34.39	990	27.43	72.3	11.32	46.88	1478.
1200	2.67	34.44	1188	27.49	67.3	12.71	62.49	1480.



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REFERENCE NO. 75- 2- 31

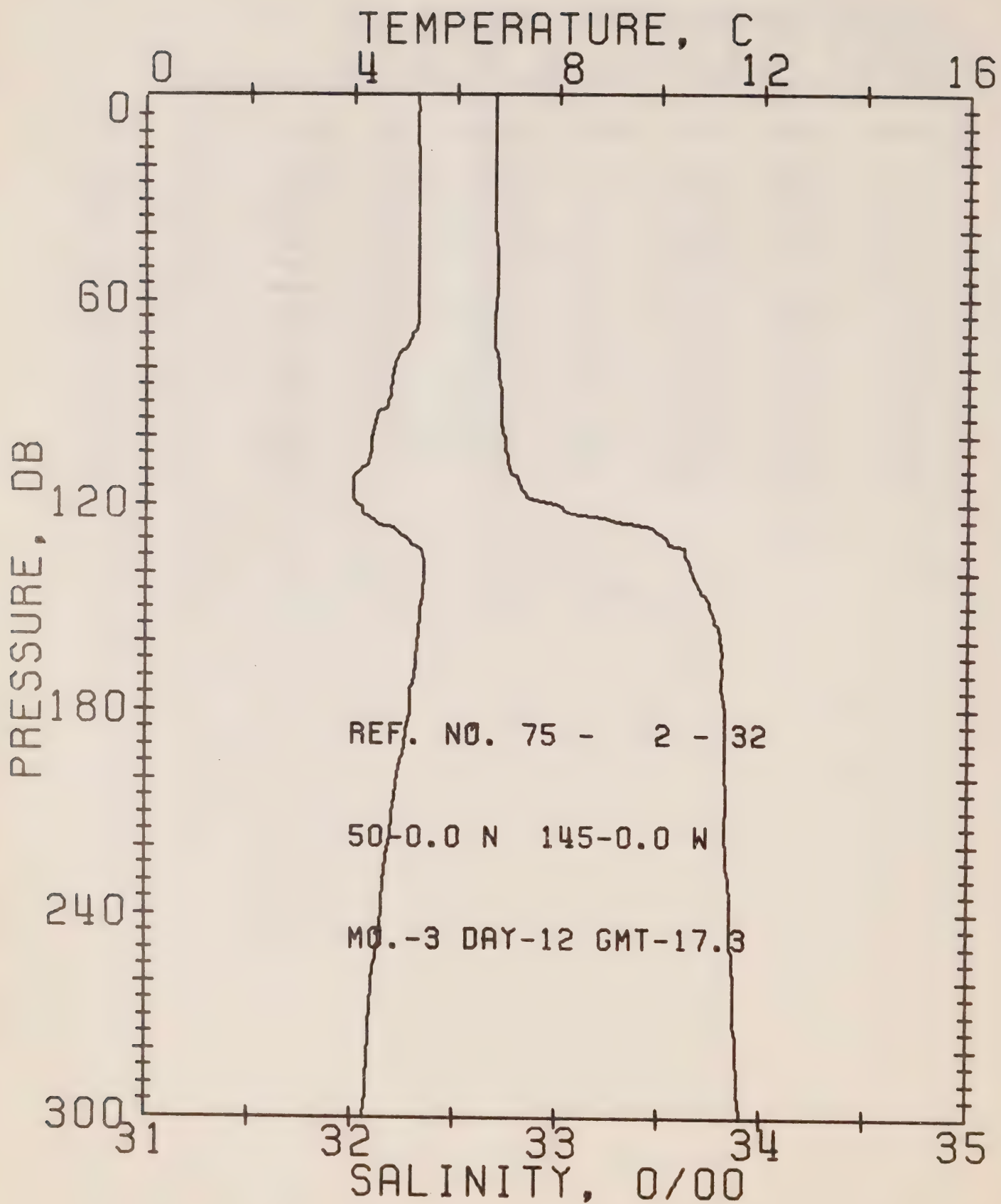
DATE 11/ 3/75

POSITION 50- 0.0N, 145- 0.0W

GMT 18.3

RESULTS OF STP CAST 154 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.86	32.64	0	25.85	216.2	0.0	0.0	1467.
10	4.86	32.70	10	25.90	211.6	0.21	0.01	1468.
20	4.86	32.70	20	25.89	212.0	0.42	0.04	1468.
30	4.86	32.71	30	25.90	211.4	0.64	0.10	1468.
50	4.85	32.71	50	25.90	211.5	1.06	0.27	1468.
75	4.75	32.71	75	25.91	210.6	1.59	0.61	1468.
100	4.38	32.74	99	25.98	204.6	2.11	1.07	1467.
125	3.97	32.80	124	26.07	196.4	2.61	1.65	1466.
150	5.06	33.47	149	26.48	157.7	3.06	2.28	1472.
175	5.30	33.78	174	26.70	137.5	3.43	2.88	1473.
200	5.06	33.92	199	26.76	132.0	3.76	3.52	1473.
225	4.70	33.82	223	26.80	128.1	4.09	4.23	1472.
250	4.58	33.85	248	26.84	124.9	4.40	4.99	1472.
300	4.34	33.89	298	26.89	119.8	5.02	6.72	1472.



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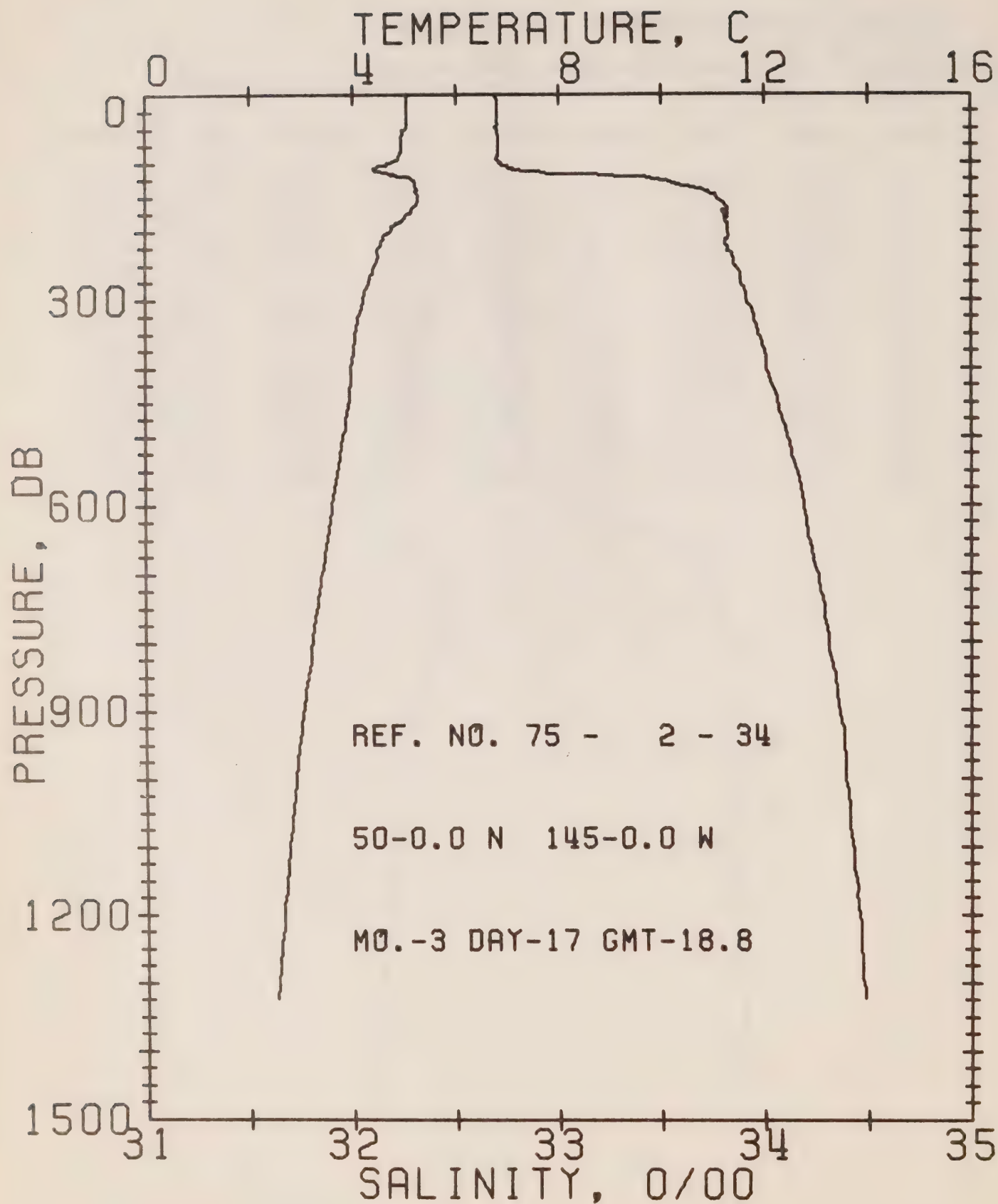
REFERENCE NO. 75- 2- 32

DATE 12/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STD CAST 122 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.23	32.69	0	25.85	216.3	0.0	0.0	1469.
10	5.23	32.69	10	25.85	216.7	0.22	0.01	1469.
20	5.24	32.69	20	25.84	216.8	0.43	0.04	1469.
30	5.24	32.69	30	25.84	216.9	0.65	0.10	1469.
50	5.25	32.70	50	25.85	216.5	1.08	0.28	1470.
75	4.96	32.69	75	25.88	214.0	1.63	0.62	1469.
100	4.36	32.73	99	25.97	205.0	2.15	1.09	1467.
125	4.46	33.29	124	26.40	164.5	2.64	1.64	1469.
150	5.32	33.74	149	26.66	140.4	3.01	2.16	1473.
175	5.13	33.80	174	26.74	133.6	3.35	2.73	1473.
200	4.88	33.82	199	26.78	129.9	3.68	3.35	1472.
225	4.65	33.83	223	26.81	127.0	4.00	4.05	1472.
250	4.49	33.85	248	26.85	124.0	4.31	4.81	1471.
300	4.24	33.90	298	26.91	117.9	4.91	6.50	1471.



OFFSHORE OCEANOGRAPHY GROUP

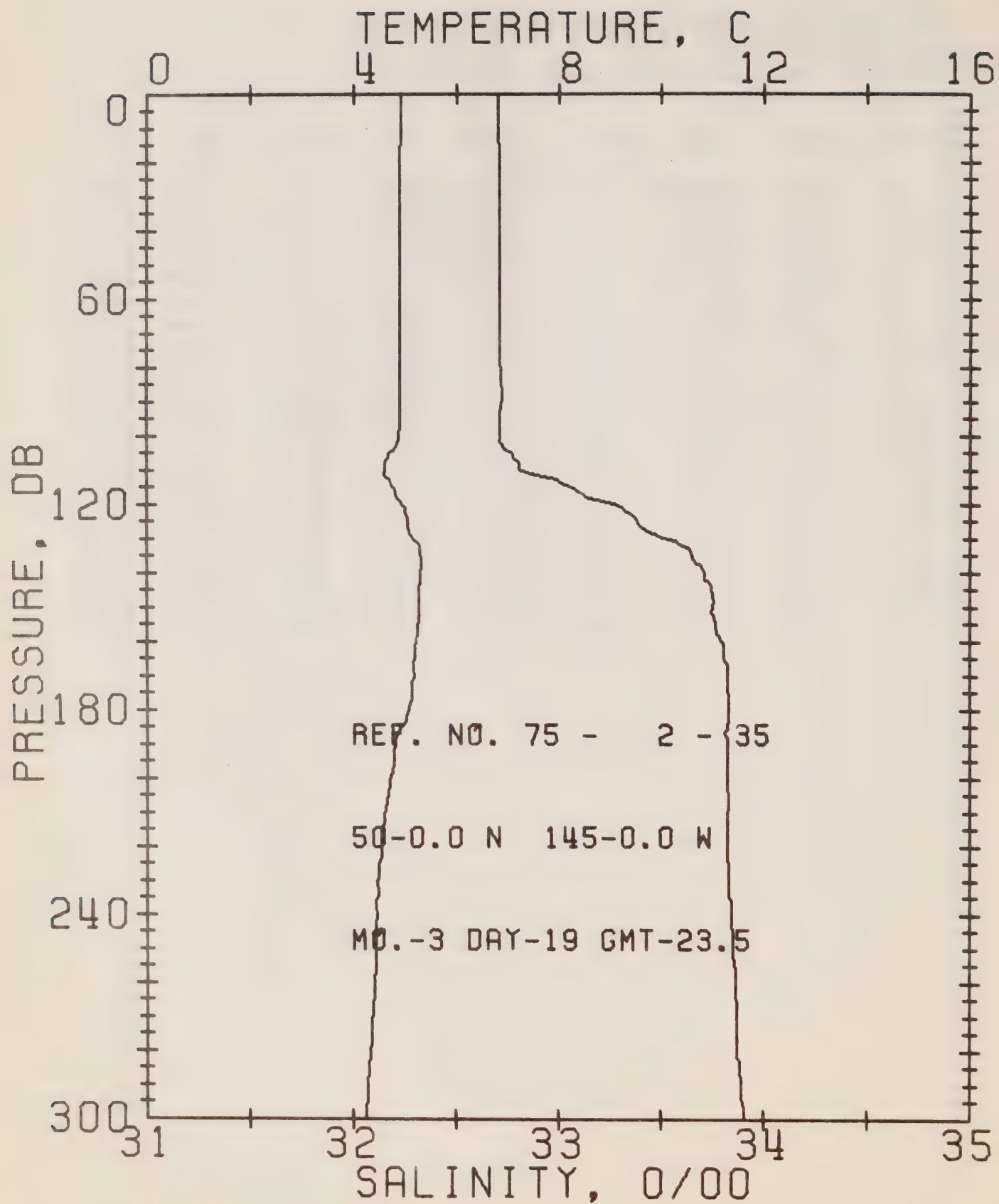
REFERENCE NO. 75- 2- 34

DATE 17/ 3/75

POSITION 50- 0.0N, 143- 0.0W GMT 18.8

RESULTS OF STP CAST 236 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.05	32.69	0	25.87	214.4	0.0	0.0	1468.
10	5.05	32.70	10	25.87	213.9	0.21	0.01	1468.
20	5.05	32.70	20	25.87	214.0	0.43	0.04	1468.
30	5.04	32.70	30	25.87	214.0	0.64	0.10	1469.
50	5.01	32.70	50	25.88	213.8	1.07	0.27	1469.
75	4.93	32.71	75	25.89	212.5	1.60	0.61	1469.
100	4.71	32.71	99	25.92	210.4	2.13	1.08	1468.
125	5.17	33.50	124	26.49	156.4	2.60	1.62	1472.
150	5.26	33.76	149	26.69	137.8	2.97	2.13	1473.
175	5.04	33.82	174	26.76	131.5	3.30	2.69	1472.
200	4.69	33.82	199	26.80	127.9	3.63	3.31	1471.
225	4.48	33.82	223	26.82	125.9	3.95	3.99	1471.
250	4.41	33.85	248	26.85	123.1	4.26	4.75	1471.
300	4.18	33.91	298	26.93	116.6	4.85	6.41	1471.
400	3.96	34.01	397	27.03	107.7	5.96	10.37	1472.
500	3.78	34.11	496	27.13	99.1	7.00	15.11	1473.
600	3.58	34.19	595	27.21	91.7	7.95	20.44	1474.
800	3.20	34.31	793	27.34	80.2	9.67	32.65	1476.
1000	2.88	34.39	990	27.43	72.1	11.18	46.47	1478.
1200	2.64	34.45	1188	27.51	65.9	12.55	61.89	1480.



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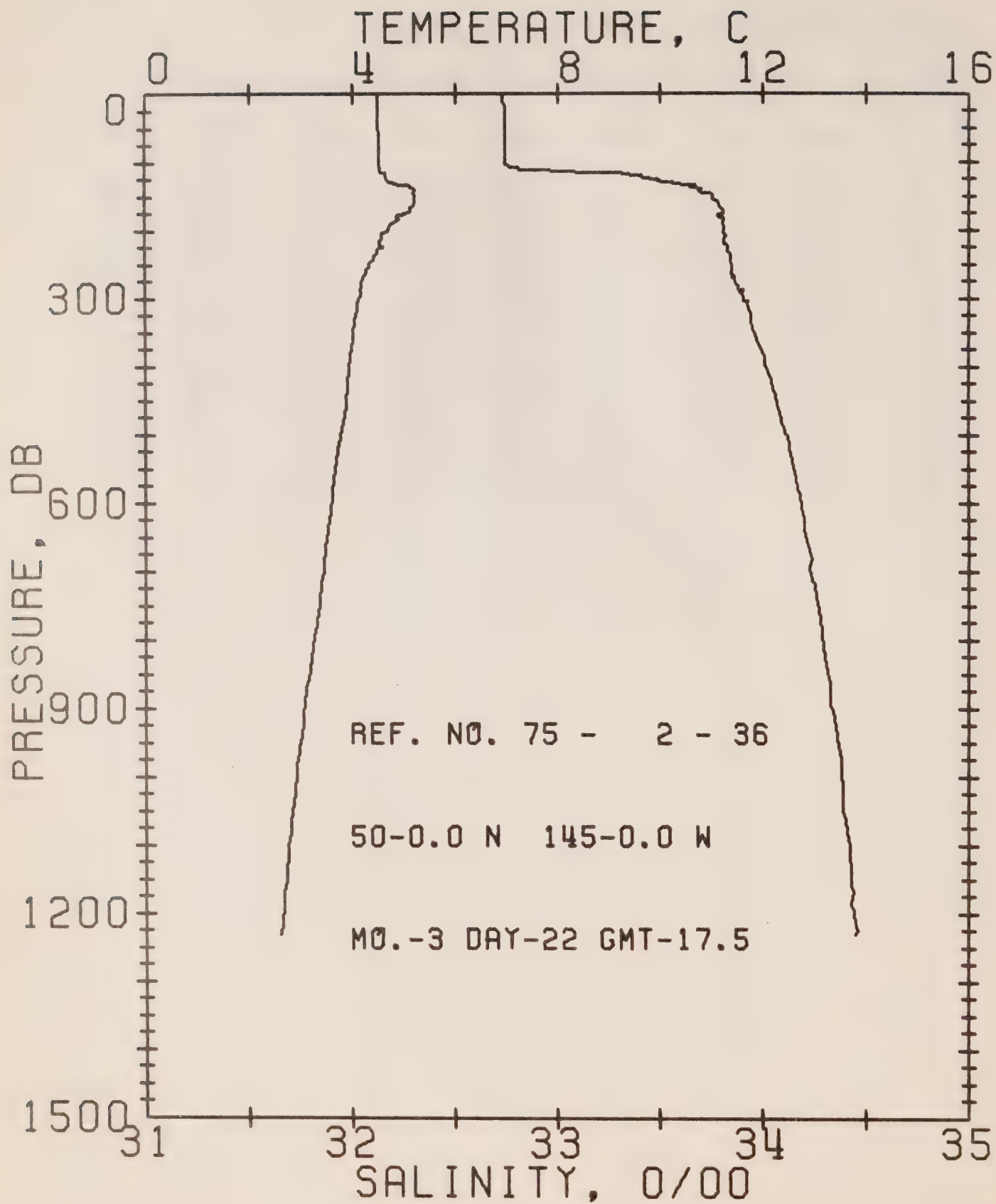
REFERENCE NO. 75- 2- 35

DATE 19/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 23.5

RESULTS OF STP CAST 151 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.91	32.70	0	25.89	212.2	0.0	0.0	1468.
10	4.90	32.70	10	25.89	212.4	0.21	0.01	1468.
20	4.89	32.71	20	25.90	211.6	0.42	0.04	1468.
30	4.89	32.71	30	25.90	211.7	0.64	0.10	1468.
50	4.89	32.71	50	25.90	211.8	1.06	0.27	1468.
75	4.88	32.71	75	25.90	212.0	1.59	0.61	1469.
100	4.86	32.71	99	25.90	212.0	2.12	1.08	1469.
125	5.03	33.38	124	26.41	163.8	2.60	1.62	1471.
150	5.25	33.75	149	26.68	139.1	2.96	2.14	1473.
175	5.12	33.82	174	26.75	132.2	3.30	2.70	1473.
200	4.70	33.82	199	26.80	128.1	3.63	3.32	1471.
225	4.49	33.83	223	26.83	125.2	3.94	4.00	1471.
250	4.42	33.85	248	26.85	123.3	4.25	4.76	1471.
300	4.22	33.90	298	26.91	117.7	4.86	6.45	1471.



OFFSHORE OCEANOGRAPHY GROUP

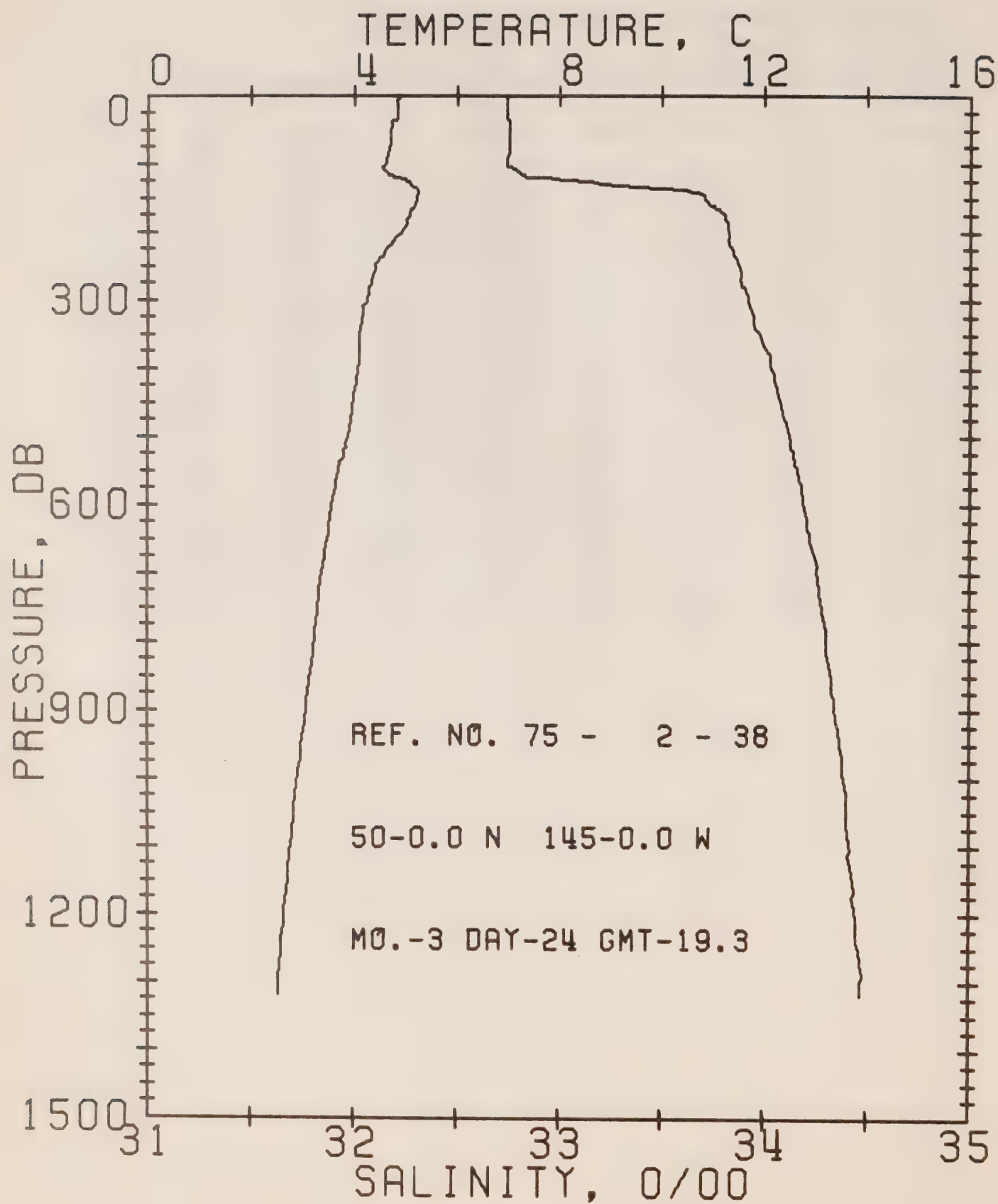
REFERENCE NO. 75- 2- 36

DATE 22/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 230 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.49	32.73	0	25.96	205.7	0.0	0.0	1466.
10	4.49	32.73	10	25.96	206.0	0.21	0.01	1466.
20	4.49	32.74	20	25.97	205.2	0.41	0.04	1466.
30	4.49	32.74	30	25.97	205.3	0.62	0.09	1466.
50	4.49	32.74	50	25.97	205.5	1.03	0.26	1467.
75	4.51	32.74	75	25.96	205.9	1.54	0.59	1467.
100	4.51	32.74	99	25.96	206.1	2.06	1.05	1468.
125	4.66	33.46	124	26.52	153.8	2.52	1.57	1470.
150	5.20	33.75	149	26.69	138.3	2.88	2.08	1473.
175	5.03	33.81	174	26.75	132.1	3.22	2.64	1472.
200	4.68	33.81	199	26.79	128.5	3.54	3.26	1471.
225	4.57	33.83	223	26.82	126.1	3.86	3.95	1471.
250	4.32	33.85	248	26.86	122.1	4.17	4.70	1471.
300	4.11	33.90	298	26.93	116.6	4.77	6.38	1471.
400	3.93	34.01	397	27.03	107.1	5.88	10.34	1472.
500	3.75	34.12	496	27.13	98.2	6.91	15.05	1473.
600	3.57	34.19	595	27.21	92.0	7.86	20.37	1474.
800	3.25	34.29	793	27.32	82.0	9.60	32.76	1476.
1000	2.90	34.38	990	27.43	72.9	11.15	46.87	1478.
1200	2.65	34.44	1188	27.49	67.1	12.54	62.49	1480.



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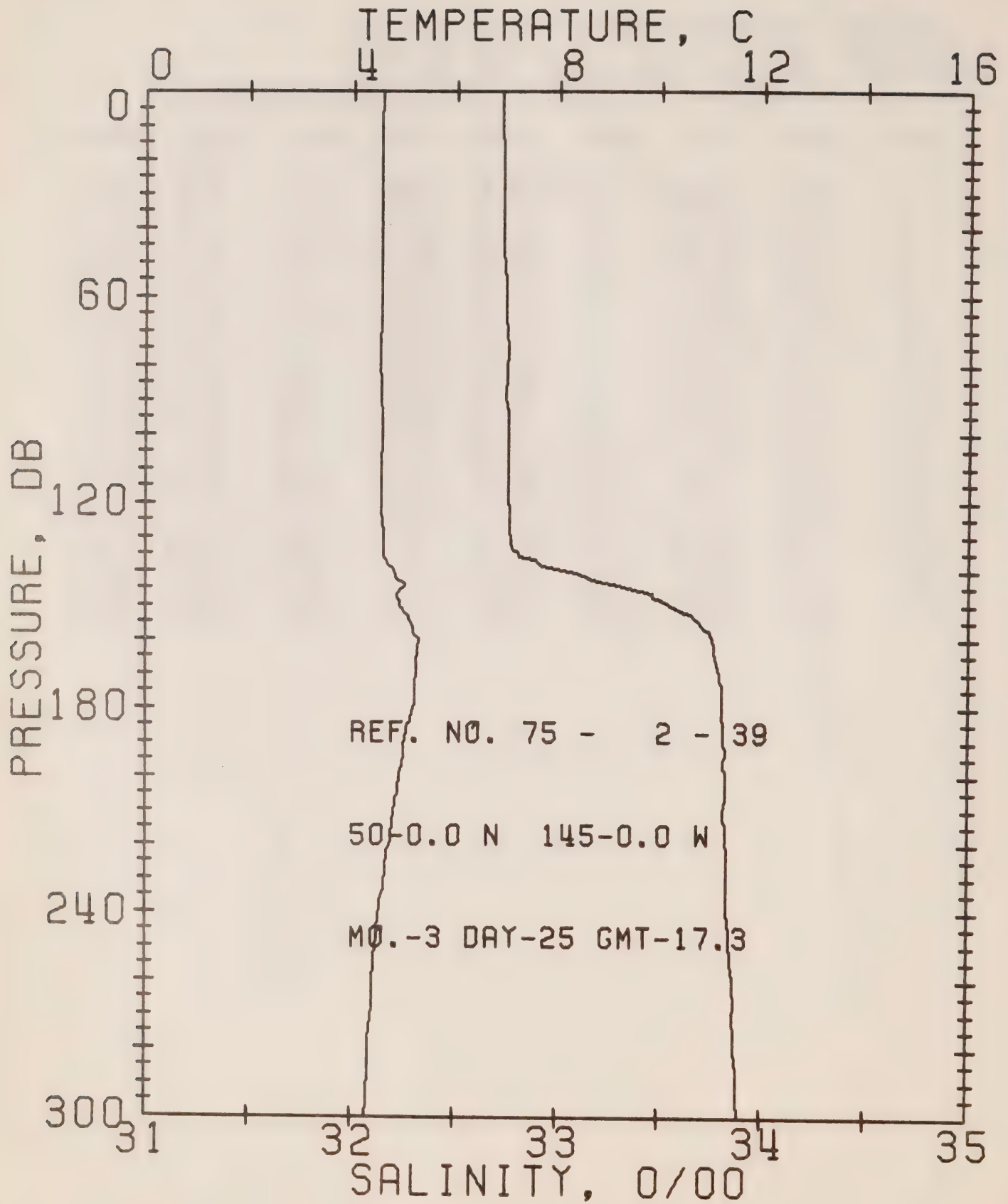
REFERENCE NO. 75- 2- 38

DATE 24/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 19.3

RESULTS OF STP CAST 248 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.86	32.74	0	25.93	208.6	0.0	0.0	1467.
10	4.84	32.74	10	25.93	208.8	0.21	0.01	1467.
20	4.84	32.74	20	25.93	208.8	0.42	0.04	1468.
30	4.83	32.74	30	25.93	208.8	0.63	0.10	1468.
50	4.69	32.75	50	25.95	206.7	1.04	0.26	1468.
75	4.67	32.75	75	25.95	206.8	1.56	0.59	1468.
100	4.59	32.74	99	25.96	206.9	2.08	1.06	1468.
125	5.02	33.11	124	26.20	184.0	2.58	1.63	1471.
150	5.19	33.71	149	26.66	141.1	2.97	2.18	1473.
175	5.06	33.80	174	26.75	133.0	3.31	2.75	1473.
200	4.91	33.83	199	26.78	129.6	3.64	3.37	1472.
225	4.62	33.84	223	26.82	125.9	3.96	4.07	1472.
250	4.40	33.88	248	26.88	121.0	4.27	4.81	1471.
300	4.23	33.92	298	26.93	116.4	4.86	6.48	1471.
400	4.05	34.03	397	27.04	106.9	5.98	10.43	1472.
500	3.86	34.12	496	27.13	99.2	7.01	15.15	1473.
600	3.55	34.19	595	27.21	91.3	7.95	20.46	1474.
800	3.21	34.30	793	27.33	81.1	9.67	32.63	1476.
1000	2.90	34.39	990	27.43	72.6	11.20	46.69	1478.
1200	2.64	34.44	1188	27.50	66.7	12.59	62.28	1480.



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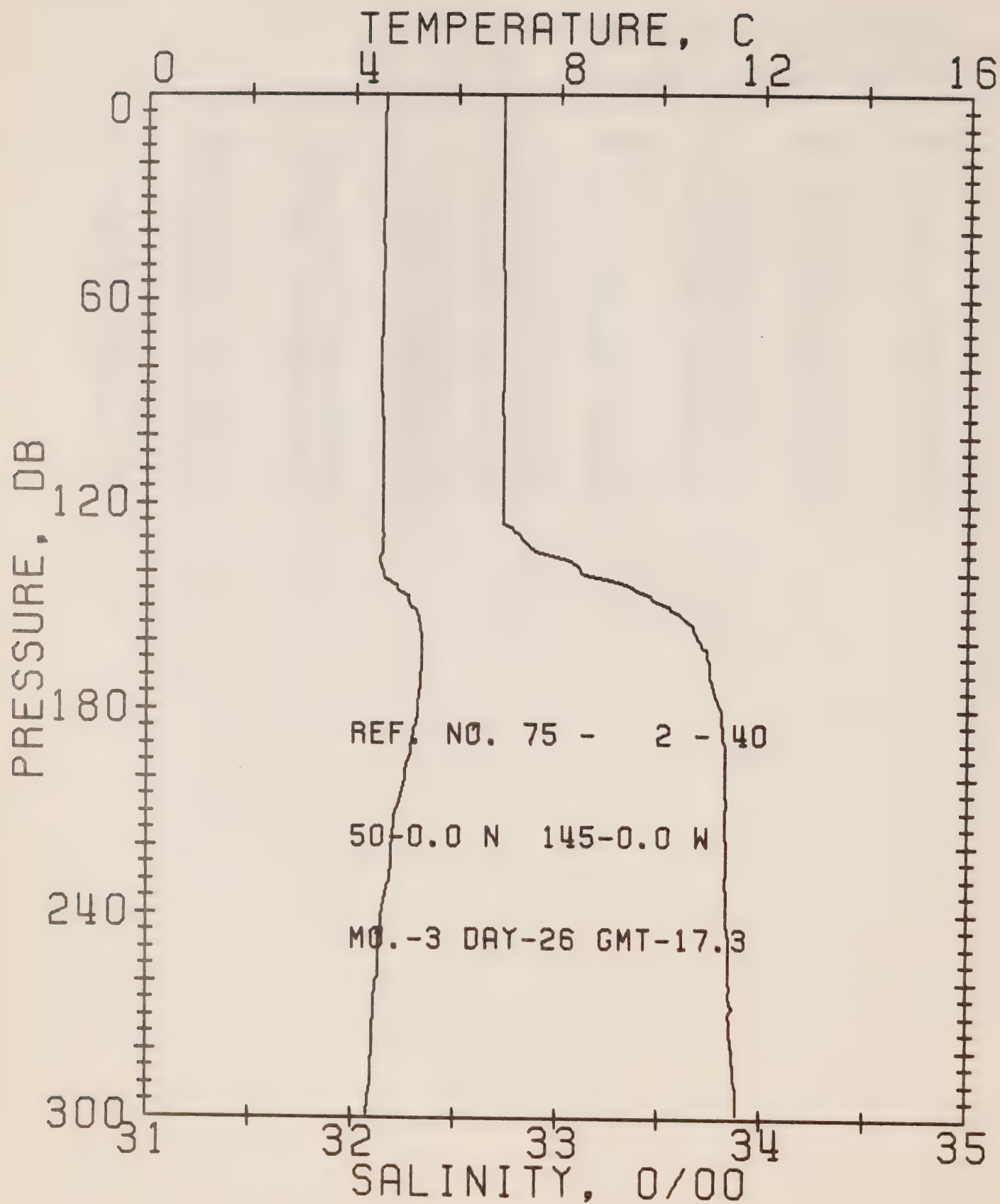
REFERENCE NO. 75- 2- 39

DATE 25/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 123 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.55	32.72	0	25.94	207.0	0.0	0.0	1466.
10	4.53	32.72	10	25.95	207.0	0.21	0.01	1466.
20	4.53	32.73	20	25.95	206.4	0.41	0.04	1466.
30	4.53	32.73	30	25.95	206.5	0.62	0.09	1467.
50	4.54	32.73	50	25.96	206.5	1.03	0.26	1467.
75	4.52	32.75	75	25.97	205.2	1.55	0.59	1467.
100	4.56	32.75	99	25.97	205.9	2.06	1.05	1468.
125	4.55	32.76	124	25.98	205.2	2.58	1.64	1468.
150	4.92	33.54	149	26.55	150.9	3.05	2.30	1471.
175	5.20	33.80	174	26.73	134.8	3.40	2.87	1473.
200	4.90	33.82	199	26.78	130.3	3.73	3.51	1472.
225	4.66	33.83	223	26.81	127.1	4.05	4.21	1472.
250	4.46	33.84	248	26.84	124.4	4.37	4.97	1471.
300	4.26	33.85	298	26.90	118.9	4.97	6.67	1471.



OFFSHORE OCEANOGRAPHY GROUP

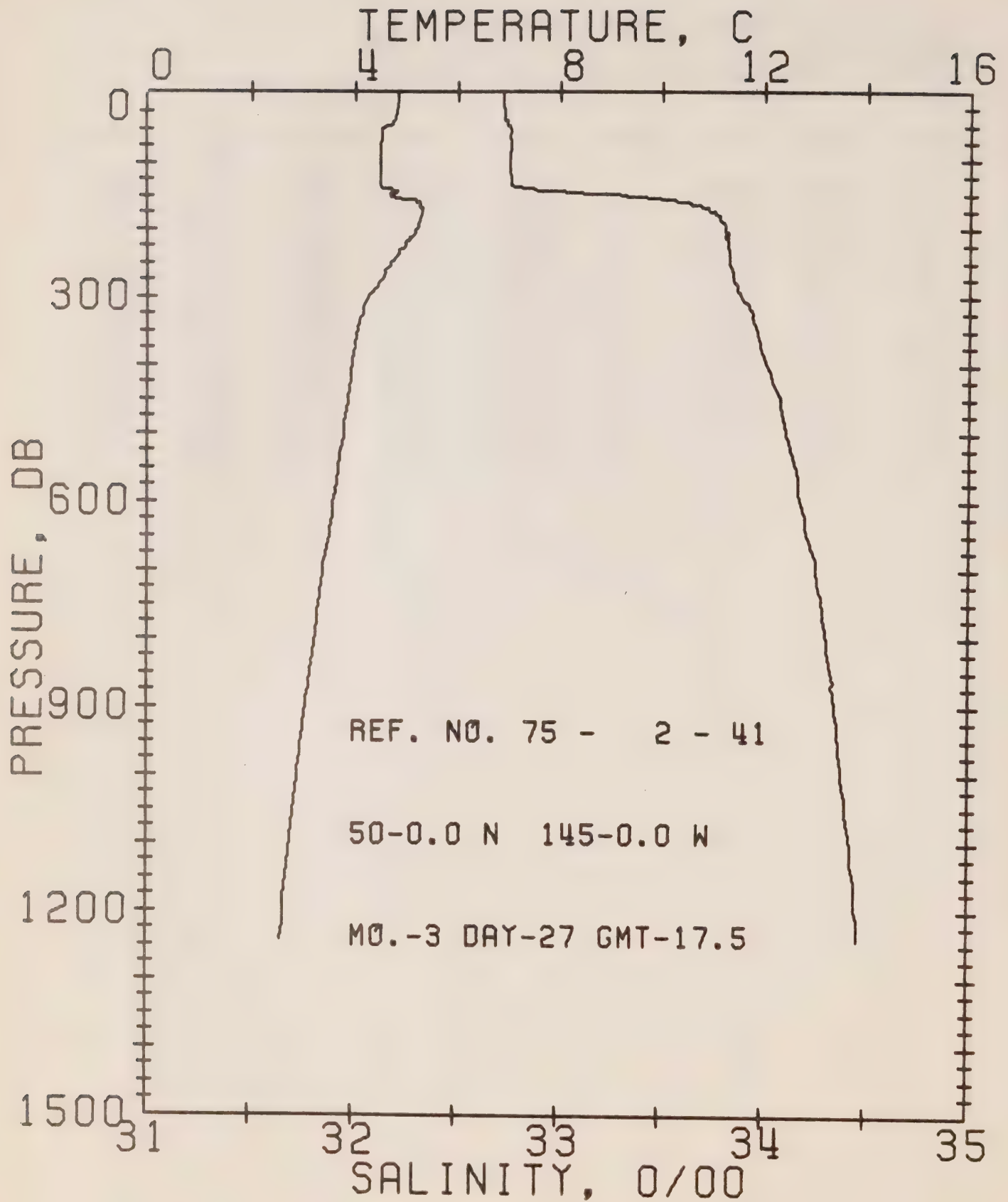
REFERENCE NO. 75- 2- 40

DATE 26/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 131 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.58	32.72	0	25.94	207.3	0.0	0.0	1466.
10	4.56	32.72	10	25.94	207.4	0.21	0.01	1466.
20	4.56	32.72	20	25.94	207.5	0.41	0.04	1466.
30	4.56	32.72	30	25.94	207.5	0.62	0.10	1467.
50	4.55	32.72	50	25.95	207.4	1.04	0.26	1467.
75	4.52	32.73	75	25.95	206.7	1.55	0.59	1467.
100	4.55	32.73	99	25.95	207.2	2.07	1.06	1468.
125	4.55	32.73	124	25.95	207.4	2.59	1.65	1468.
150	5.12	33.54	149	26.53	153.1	3.05	2.29	1472.
175	5.29	33.76	174	26.68	138.8	3.41	2.88	1473.
200	5.00	33.82	199	26.77	131.3	3.74	3.52	1473.
225	4.74	33.83	223	26.80	127.9	4.07	4.22	1472.
250	4.51	33.84	243	26.84	125.0	4.38	4.99	1472.



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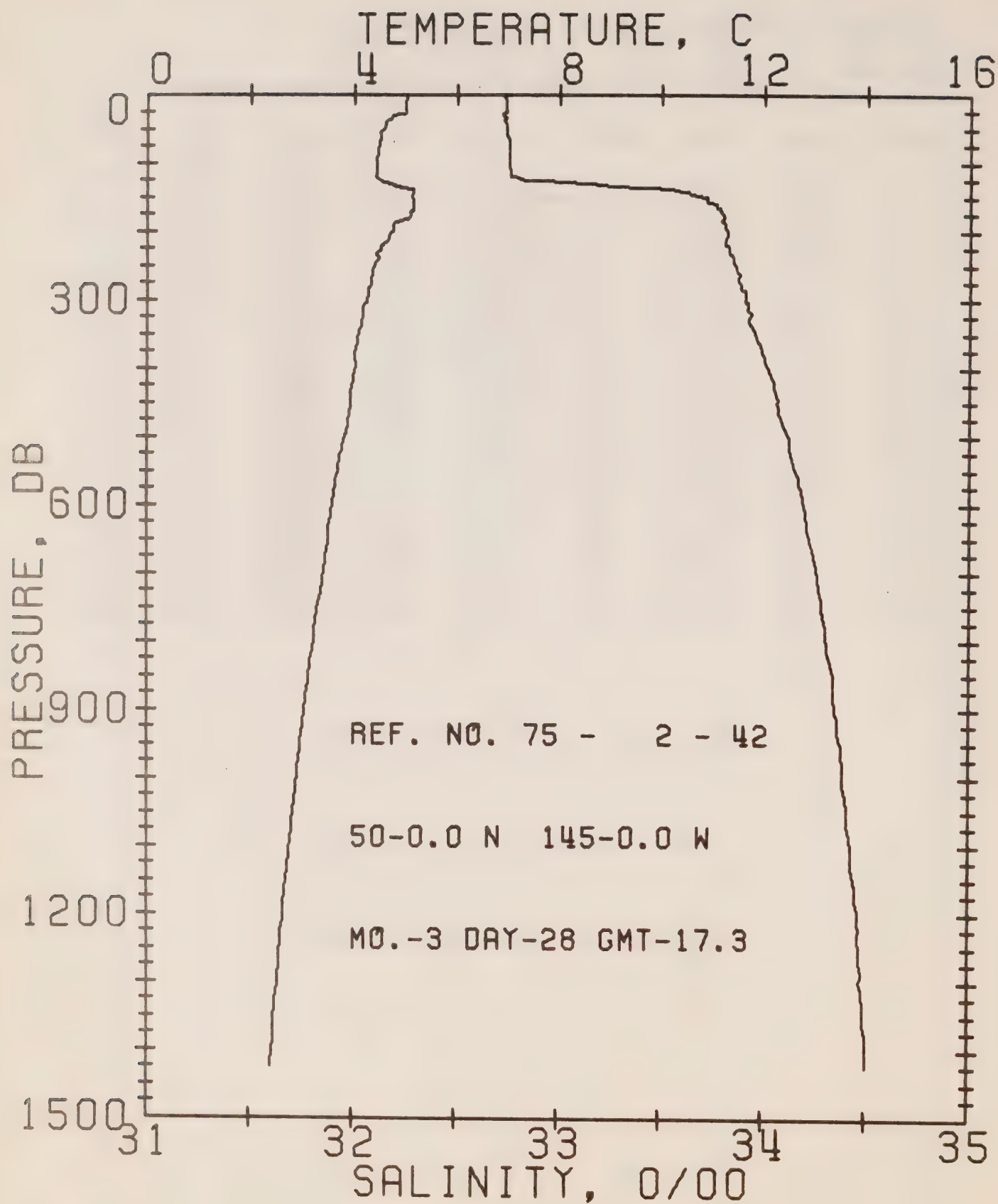
REFERENCE NO. 75- 2- 41

DATE 27/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 243 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.84	32.72	0	25.91	209.9	0.0	0.0	1467.
10	4.82	32.72	10	25.91	210.0	0.21	0.01	1467.
20	4.82	32.72	20	25.91	210.1	0.42	0.04	1468.
30	4.79	32.73	30	25.93	209.1	0.63	0.10	1468.
50	4.64	32.75	50	25.96	206.3	1.05	0.27	1467.
75	4.49	32.76	75	25.98	204.2	1.56	0.59	1467.
100	4.48	32.75	99	25.98	204.9	2.07	1.05	1467.
125	4.48	32.76	124	25.98	204.8	2.58	1.64	1468.
150	4.69	33.23	149	26.33	171.6	3.08	2.33	1470.
175	5.31	33.74	174	26.67	140.5	3.46	2.96	1473.
200	5.20	33.81	199	26.73	134.4	3.80	3.61	1474.
225	4.98	33.82	223	26.77	131.4	4.13	4.33	1473.
250	4.70	33.83	248	26.81	127.8	4.46	5.11	1472.
300	4.26	33.89	298	26.90	119.1	5.08	6.85	1471.
400	3.94	34.01	397	27.03	107.1	6.20	10.83	1472.
500	3.79	34.11	496	27.12	99.2	7.22	15.53	1473.
600	3.59	34.18	595	27.20	92.8	8.18	20.88	1474.
800	3.24	34.31	793	27.33	80.9	9.90	33.14	1476.
1000	2.91	34.38	990	27.42	73.2	11.43	47.18	1478.
1200	2.63	34.45	1188	27.51	65.9	12.82	62.65	1480.



OFFSHORE OCEANOGRAPHY GROUP

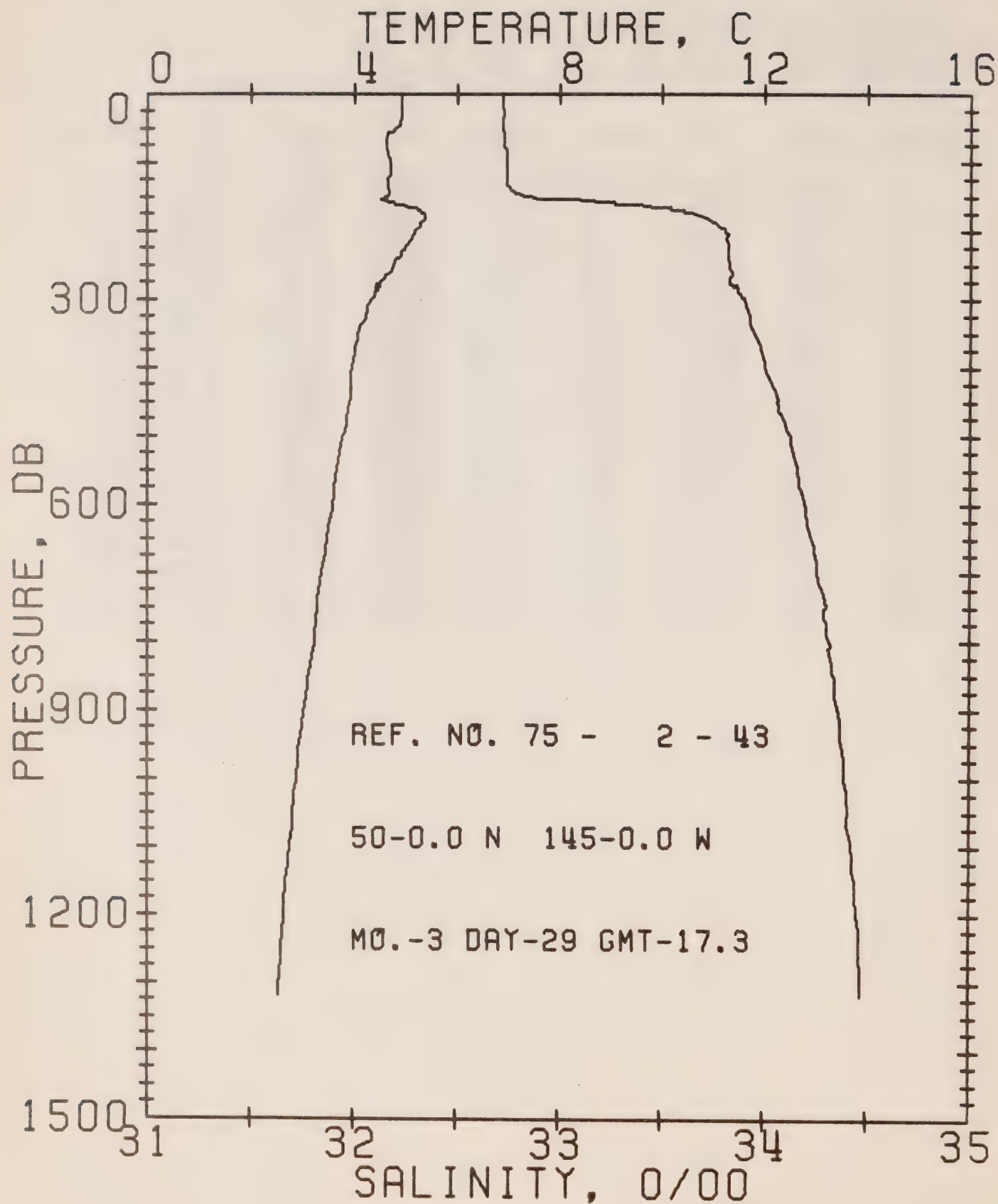
REFERENCE NO. 75- 2- 42

DATE 28/ 3/75

POSITION 50- 0.0N, 145- 0.0W GMT 17.3

RESULTS OF STP CAST 258 PCINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.00	32.73	0	25.90	210.8	0.0	0.0	1468.
10	4.99	32.74	10	25.91	210.3	0.21	0.01	1468.
20	4.99	32.74	20	25.91	210.4	0.42	0.04	1468.
30	4.74	32.73	30	25.93	208.7	0.63	0.10	1467.
50	4.56	32.74	50	25.96	206.2	1.05	0.27	1467.
75	4.46	32.75	75	25.98	204.6	1.56	0.59	1467.
100	4.44	32.75	99	25.98	204.7	2.07	1.05	1467.
125	4.51	32.85	124	26.05	198.0	2.58	1.63	1468.
150	5.12	33.71	149	26.66	140.4	2.98	2.19	1472.
175	5.09	33.80	174	26.74	133.6	3.32	2.76	1473.
200	4.74	33.82	199	26.79	128.5	3.65	3.38	1472.
225	4.51	33.83	223	26.83	125.4	3.97	4.07	1471.
250	4.38	33.86	248	26.86	122.2	4.28	4.82	1471.
300	4.24	33.91	298	26.92	117.2	4.88	6.50	1471.
400	4.01	34.02	397	27.03	107.6	6.00	10.50	1472.
500	3.80	34.11	496	27.13	98.9	7.04	15.24	1473.
600	3.56	34.19	595	27.21	91.3	7.99	20.57	1474.
800	3.21	34.30	793	27.34	80.7	9.70	32.78	1476.
1000	2.89	34.39	990	27.43	72.2	11.23	46.70	1478.
1200	2.64	34.46	1188	27.51	65.4	12.60	62.11	1480.



OFFSHORE OCEANOGRAPHY GROUP

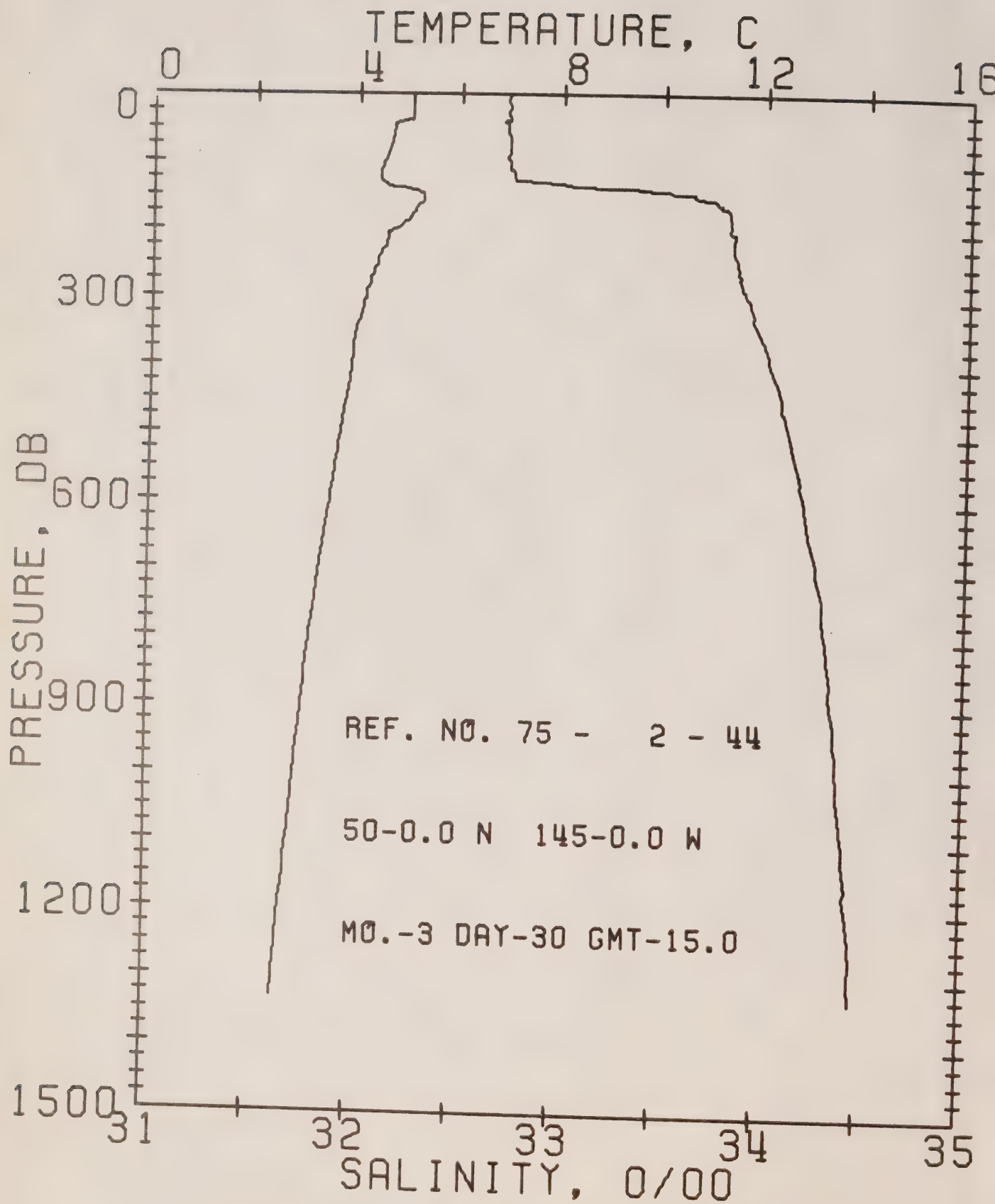
REFERENCE NO. 75- 2- 43

DATE 29/ 3/75

POSITION 50- 0.0N. 145- 0.0W GMT 17.3

RESULTS OF STP CAST 241 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.91	32.72	0	25.90	210.6	0.0	0.0	1468.
10	4.90	32.72	10	25.91	210.9	0.21	0.01	1468.
20	4.90	32.72	20	25.91	210.9	0.42	0.04	1468.
30	4.90	32.73	30	25.91	210.3	0.63	0.10	1468.
50	4.79	32.72	50	25.92	210.1	1.05	0.27	1468.
75	4.62	32.73	75	25.94	207.7	1.57	0.60	1468.
100	4.68	32.74	99	25.95	207.8	2.09	1.06	1468.
125	4.65	32.74	124	25.95	207.7	2.61	1.66	1469.
150	4.63	32.83	149	26.02	201.0	3.13	2.38	1469.
175	5.35	33.66	174	26.60	147.0	3.55	3.07	1474.
200	5.18	33.81	199	26.74	134.1	3.90	3.74	1473.
225	4.96	33.82	223	26.77	131.2	4.23	4.46	1473.
250	4.74	33.83	248	26.80	128.2	4.55	5.24	1472.
300	4.33	33.90	298	26.90	118.9	5.18	6.99	1472.
400	3.94	34.00	397	27.02	108.0	6.31	11.01	1472.
500	3.78	34.13	496	27.14	97.8	7.34	15.73	1473.
600	3.57	34.20	595	27.22	91.1	8.28	21.02	1474.
800	3.22	34.32	793	27.34	80.0	9.99	33.14	1476.
1000	2.87	34.39	990	27.43	72.0	11.50	46.99	1478.
1200	2.63	34.45	1188	27.50	66.1	12.88	62.43	1480.



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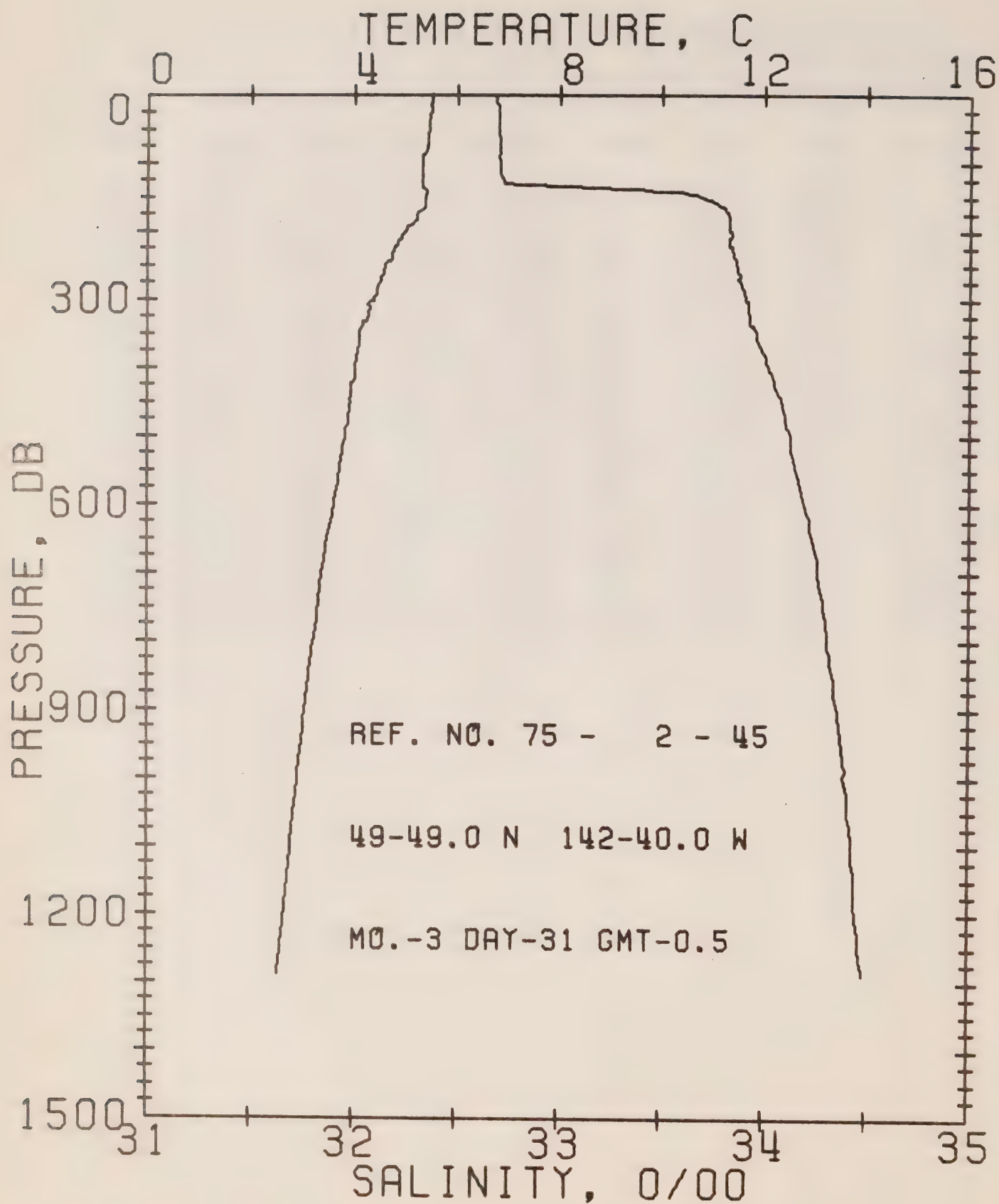
REFERENCE NO. 75- 2- 44

DATE 30/ 3/75

POSITION 50- 0.0N, 145- 0.0W, GMT 15.0

RESULTS OF STP CAST 186 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.05	32.74	0	25.91	210.6	0.0	0.0	1468.
10	5.05	32.73	10	25.90	211.7	0.21	0.01	1468.
20	5.03	32.74	20	25.91	210.9	0.42	0.04	1468.
30	5.04	32.73	30	25.90	211.8	0.63	0.10	1469.
50	4.67	32.73	50	25.94	208.1	1.05	0.27	1467.
75	4.62	32.74	75	25.95	206.9	1.57	0.60	1468.
100	4.48	32.74	99	25.97	205.8	2.09	1.06	1467.
125	4.43	32.76	124	25.99	203.6	2.60	1.65	1468.
150	5.28	33.65	149	26.60	146.7	3.03	2.25	1473.
175	5.08	33.82	174	26.76	132.0	3.38	2.82	1473.
200	4.70	33.82	199	26.80	127.6	3.70	3.44	1471.
225	4.56	33.84	223	26.83	125.2	4.01	4.11	1471.
250	4.39	33.86	248	26.86	122.1	4.32	4.86	1471.
300	4.18	33.92	298	26.93	115.8	4.92	6.53	1471.
400	3.92	34.03	397	27.05	105.6	6.02	10.46	1472.
500	3.72	34.13	496	27.15	96.8	7.03	15.08	1473.
600	3.54	34.21	595	27.23	89.9	7.97	20.31	1474.
800	3.17	34.32	793	27.35	79.3	9.65	32.29	1476.
1000	2.91	34.38	990	27.43	72.8	11.17	46.18	1478.
1200	2.66	34.44	1188	27.50	66.8	12.56	61.82	1480.



OFFSHORE OCEANOGRAPHY GROUP

REFERENCE NO. 75- 2- 45

DATE 31/ 3/75

POSITION 49-49.0N, 142-40.0W GMT 0.5

RESULTS OF STP CAST 262 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.50	32.69	0	25.81	219.2	0.0	0.0	1470.
10	5.49	32.69	10	25.82	219.5	0.22	0.01	1470.
20	5.48	32.70	20	25.82	218.8	0.44	0.04	1470.
30	5.46	32.70	30	25.83	218.6	0.66	0.10	1470.
50	5.43	32.70	50	25.83	218.4	1.09	0.28	1471.
75	5.41	32.71	75	25.84	217.8	1.64	0.63	1471.
100	5.31	32.71	99	25.85	216.9	2.18	1.11	1471.
125	5.31	32.72	124	25.86	216.3	2.72	1.73	1471.
150	5.36	33.69	149	26.62	144.6	3.17	2.35	1473.
175	5.21	33.82	174	26.74	133.5	3.51	2.92	1473.
200	4.96	33.84	199	26.79	129.4	3.84	3.55	1473.
225	4.77	33.84	223	26.81	127.5	4.17	4.25	1472.
250	4.60	33.86	248	26.84	124.4	4.48	5.01	1472.
300	4.36	33.91	298	26.91	118.5	5.09	6.71	1472.
400	4.01	34.02	397	27.03	107.6	6.22	10.72	1472.
500	3.82	34.13	496	27.14	98.0	7.24	15.41	1473.
600	3.59	34.20	595	27.21	91.3	8.19	20.74	1474.
800	3.20	34.31	793	27.34	80.3	9.89	32.84	1476.
1000	2.91	34.39	990	27.43	72.2	11.41	46.72	1478.
1200	2.64	34.45	1188	27.50	66.3	12.79	62.16	1480.

BATHYTHERMOGRAPH OBSERVATIONS
(P-75-2)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all BT's taken on Line P outbound and inbound, and one a day on Station P.

Although BT's at Station P were taken every three hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes force the cancellation of a BT, in that case an XBT was taken. These XBT's are shown following the BT's.

EXPLANATION OF HEADINGS

Example: 0030 / 13-04-74

48° 34' N.

125° 30' W.

0030 = Time in GMT

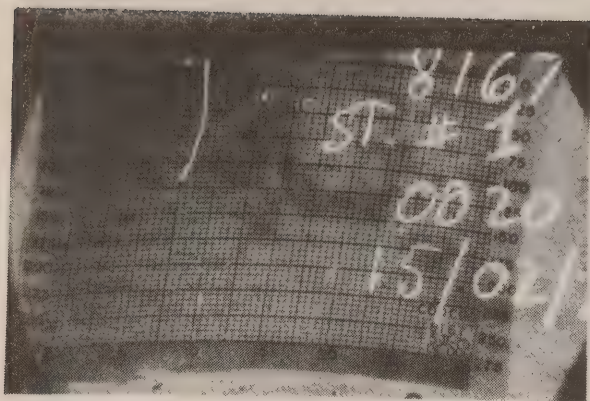
13 = Day

04 = Month

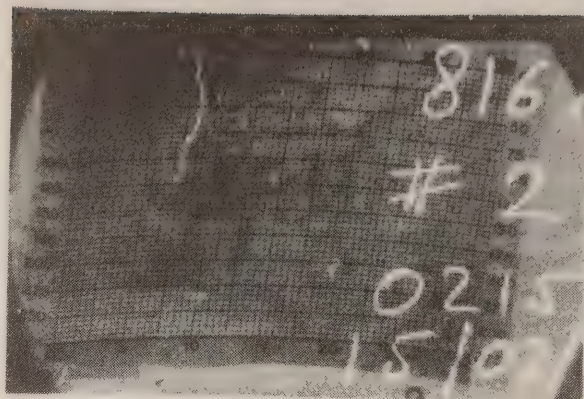
74 = Year

48° 34' N. = Latitude

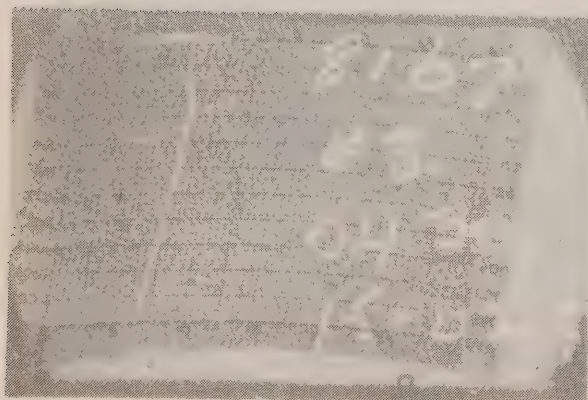
125° 30' W. = Longitude



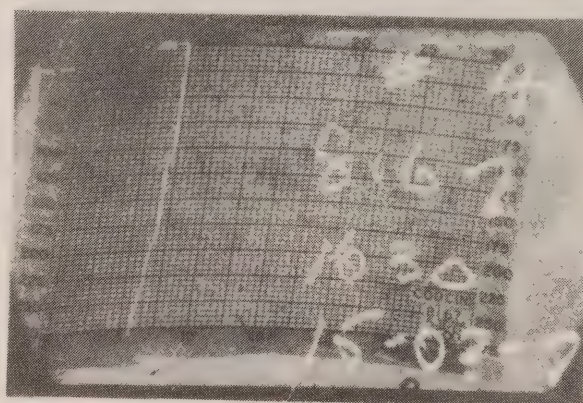
0020 / 15-02-75
 48° 33' N.
 125° 32' W.



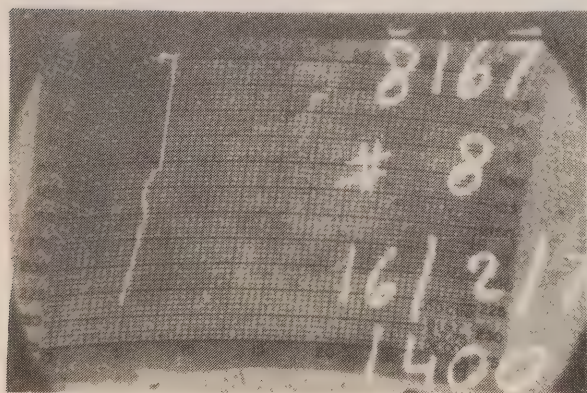
0215 / 15-02-75
 48° 38' N.
 126° 00' W.



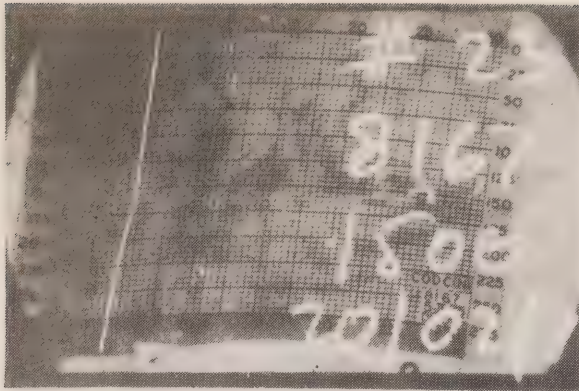
0430 / 15-02-75
 48° 42' N.
 126° 40' W.



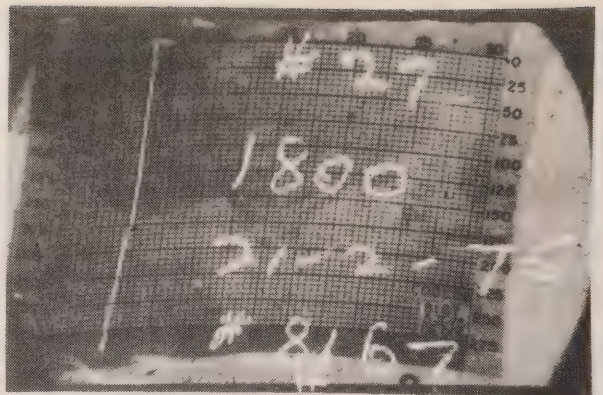
1630 / 15-02-75
 49° 02' N.
 130° 40' W.



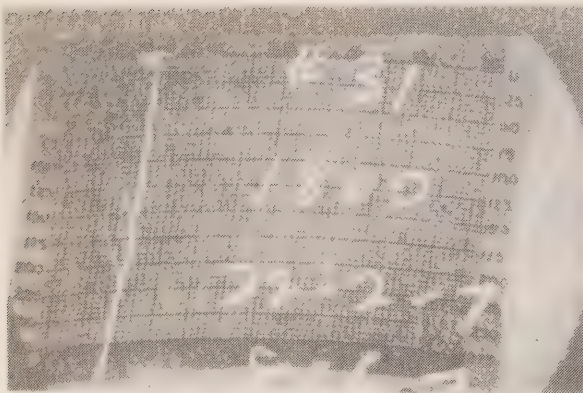
1400 / 16-02-75
 49° 22' N.
 135° 40' W.



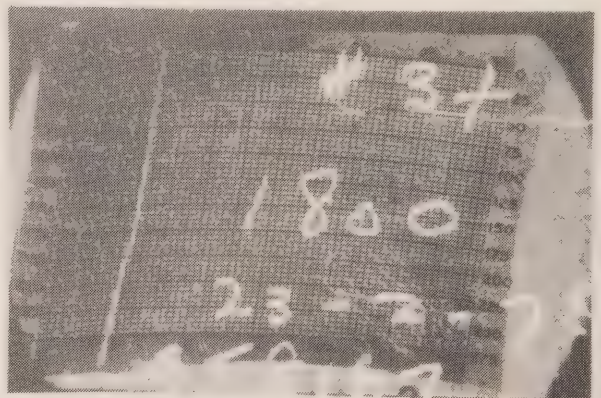
1500 / 20-02-75
 50° 06' N.
 144° 49' W.



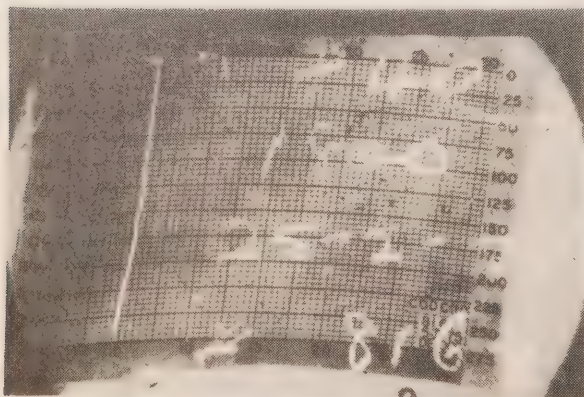
1800 / 21-02-75
 50° 00' N.
 145° 00' W.



1800 / 22-02-75
 49° 58' N.
 145° 06' W.



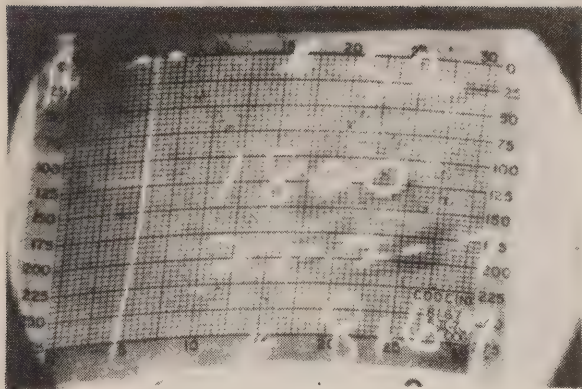
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 144° 52' W.



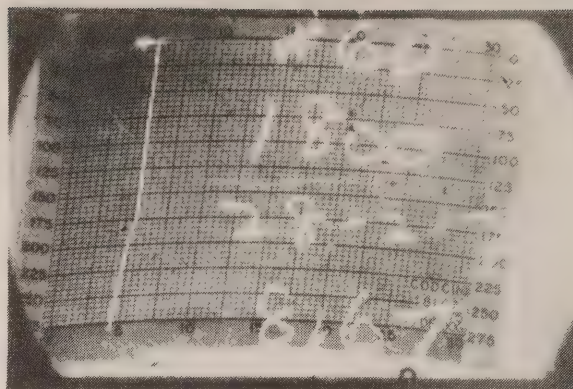
1800 / 25-02-75
 49° 58' N.
 145° 01' W.



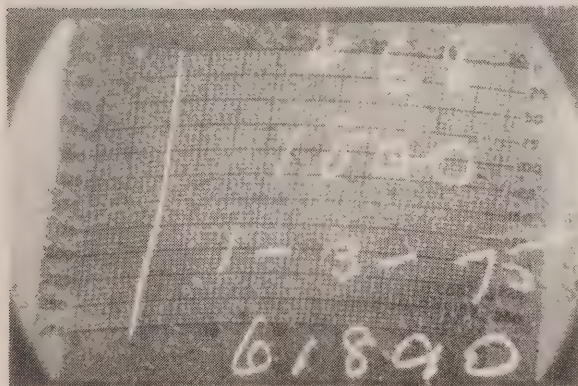
1800 / 26-02-75
 50° 05' N.
 145° 05' W.



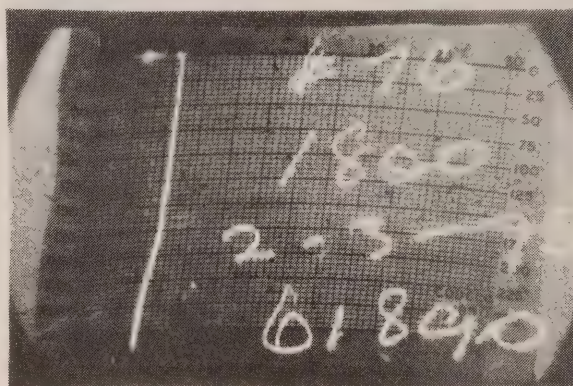
1800 / 27-02-75
 50° 01' N.
 145° 05' W.



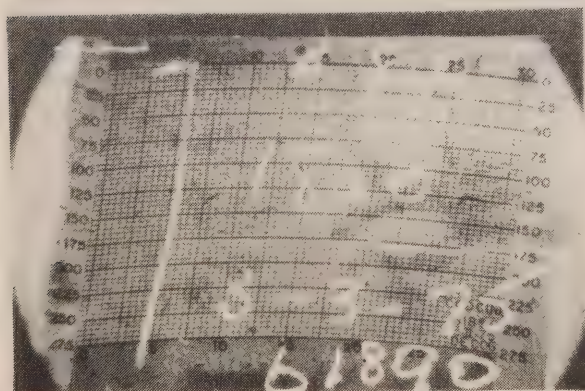
1800 / 28-02-75
 50° 01' N.
 144° 57' W.



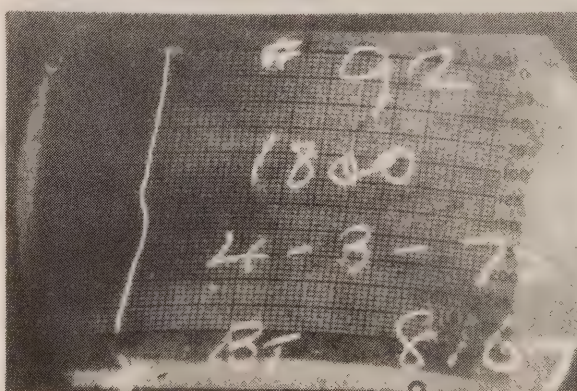
1800 / 01-03-75
 49° 59' N.
 145° 01' W.



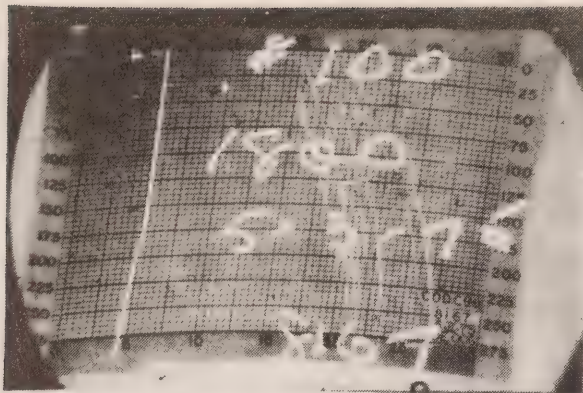
1800 / 02-03-75
 49° 57' N.
 145° 04' W.



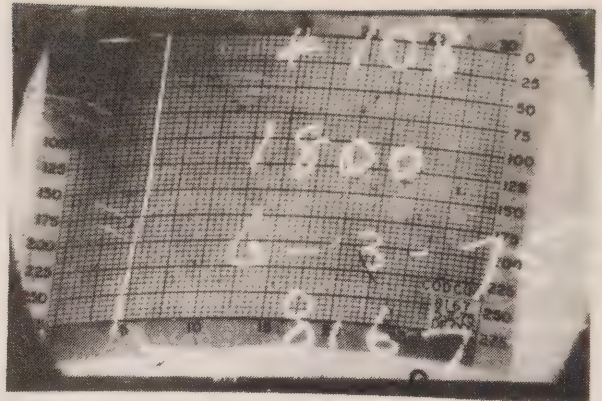
1800 / 03-03-75
 50° 01' N.
 145° 01' W.



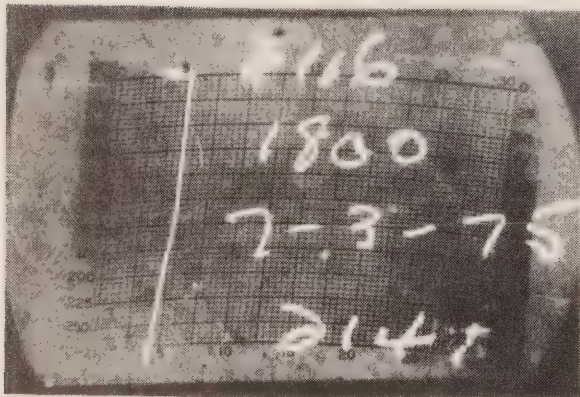
1800 / 04-03-75
 50° 03' N.
 144° 55' W.



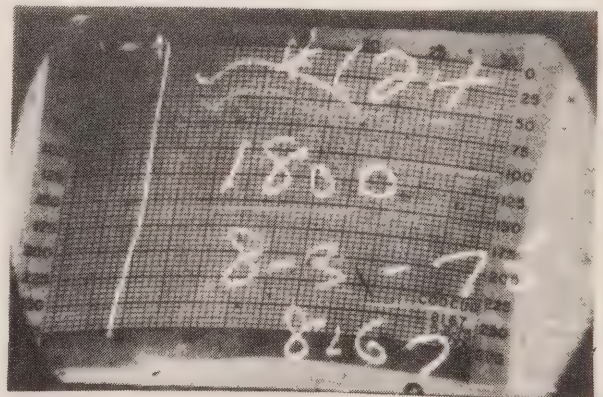
1800 / 05-03-75
 50° 01' N.
 145° 01' W.



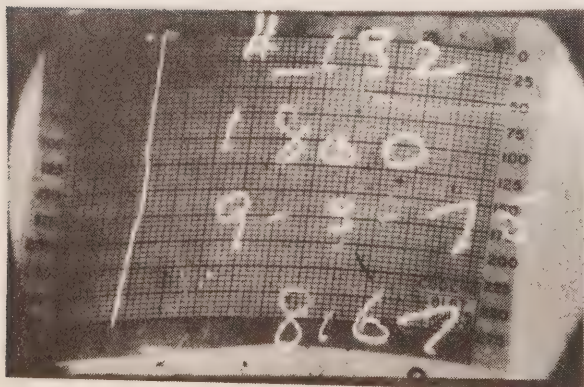
1800 / 06-03-75
 49° 59' N.
 144° 57' W.



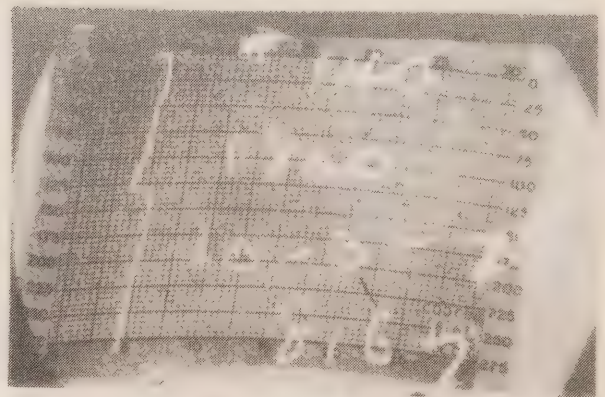
1800 / 07-03-75
 50° 00' N.
 145° 00' W.



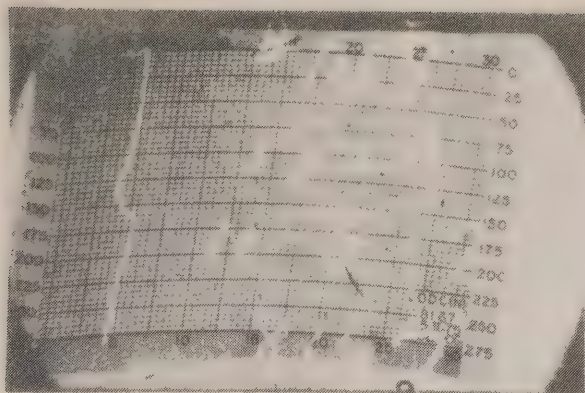
1800 / 08-03-75
 49° 58' N.
 144° 52' W.



1800 / 09-03-75
 50° 02' N.
 145° 03' W.



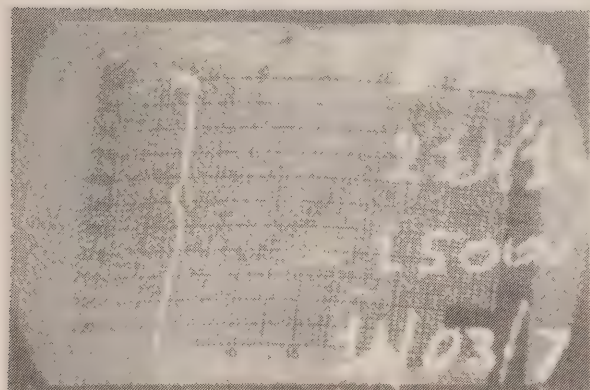
1800 / 10-03-75
 50° 03' N.
 144° 58' W.



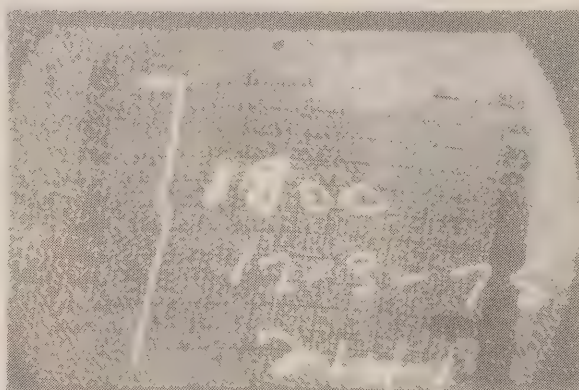
1800 / 11-03-75
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145° 00' W.



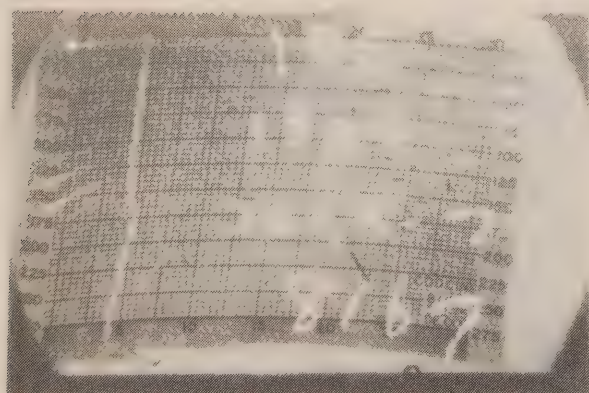
1800 / 12-03-75
50° 01' N.
144° 59' W.



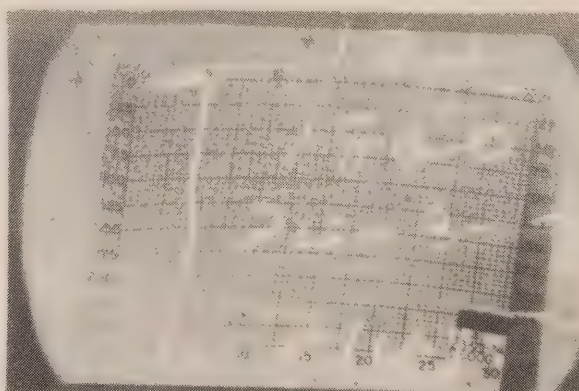
1500 / 16-03-75
50° 00' N.
144° 57' W.



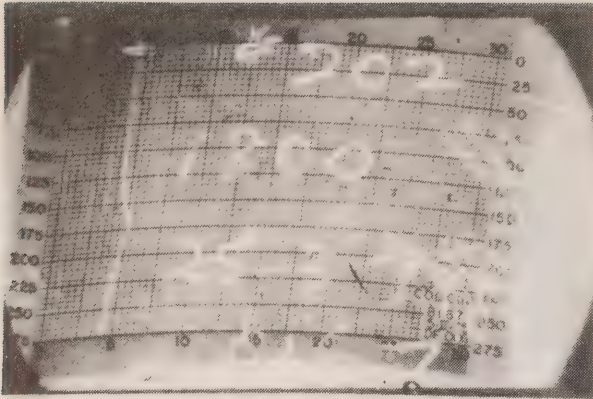
1800 / 17-03-75
50° 00' N.
145° 00' W.



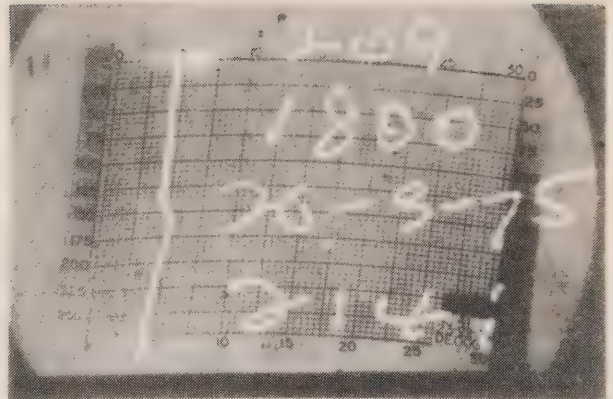
1800 / 22-03-75
49° 58' N.
144° 46' W.



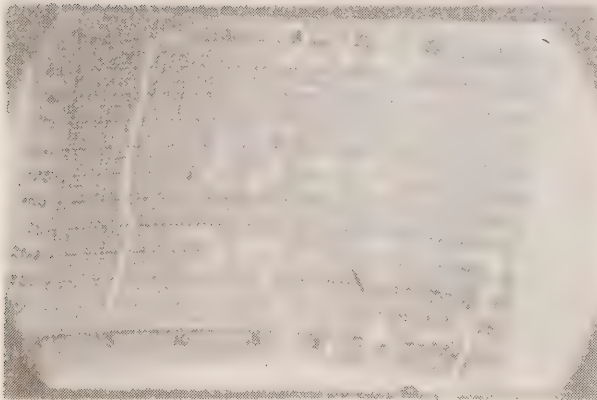
1800 / 24-03-75
49° 54' N.
144° 58' W.



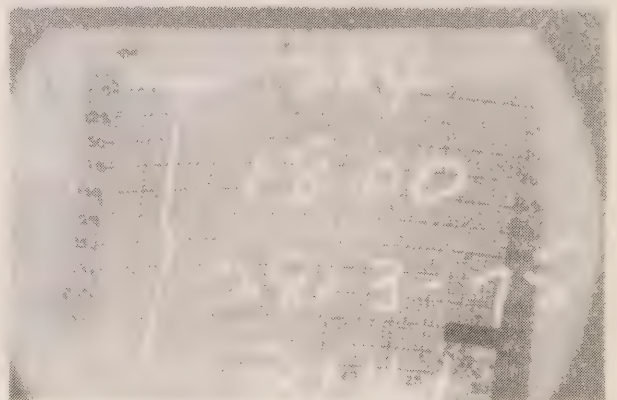
1800 / 25-03-75
 50° 04' N.
 144° 58' W.



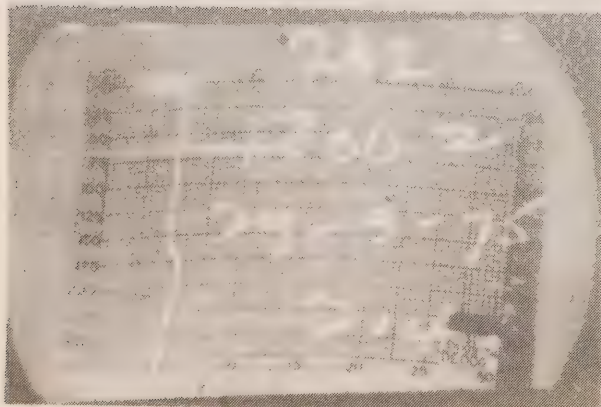
1800 / 26-03-75
 50° 03' N.
 144° 53' W.



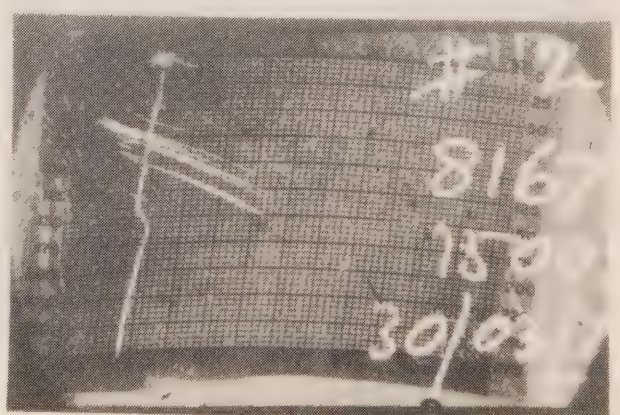
1800 / 27-03-75
 50° 03' N.
 144° 56' W.



1800 / 28-03-75
 49° 56' N.
 145° 02' W.



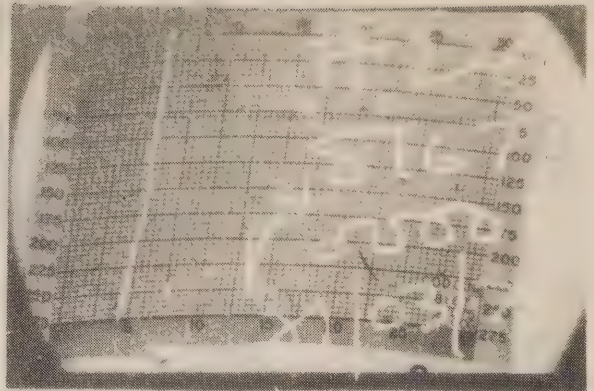
1800 / 29-03-75
 50° 01' N.
 144° 55' W.



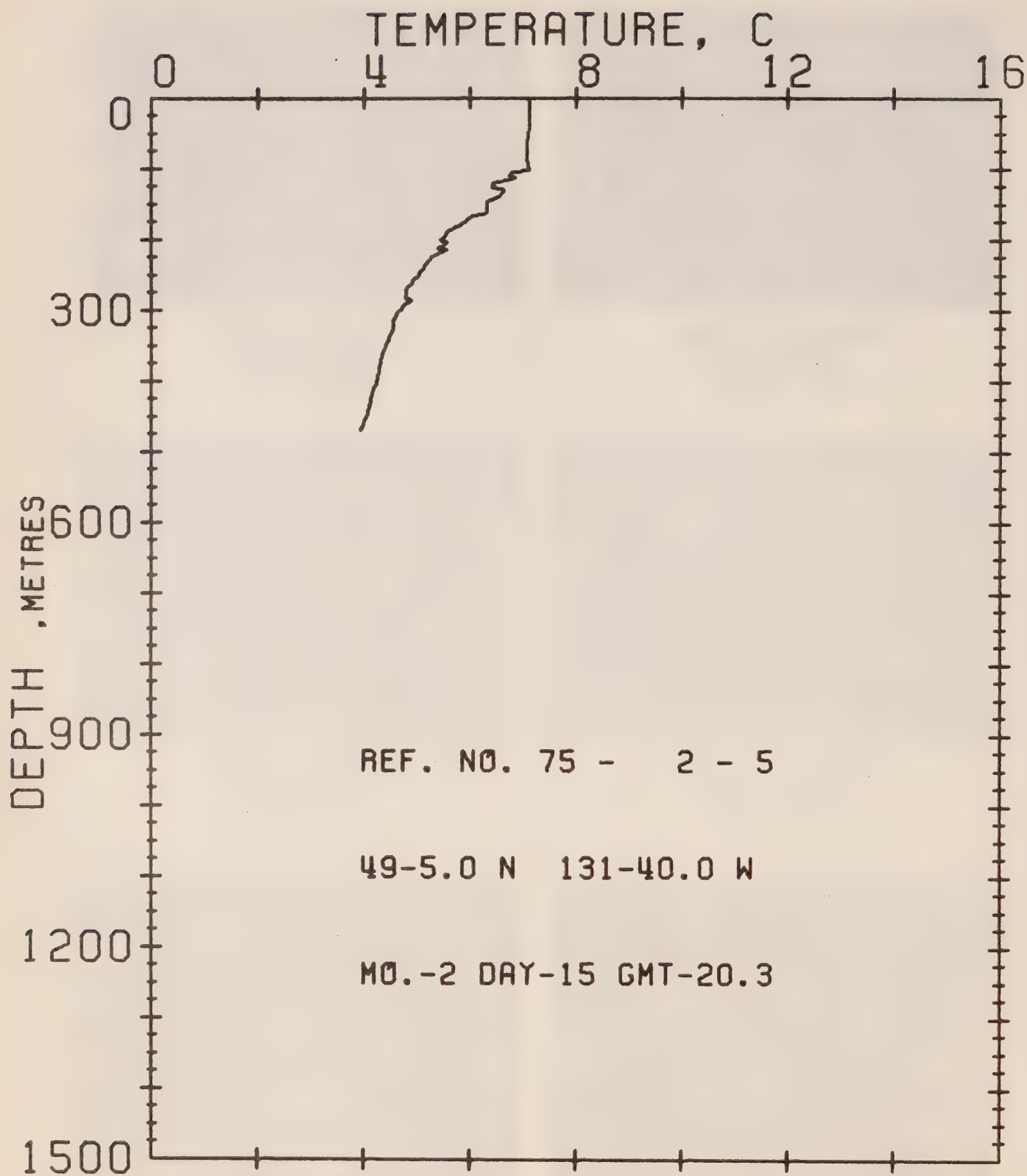
1500 / 30-03-75
 49° 59' N.
 145° 00' W.



2030 / 30-03-75
 49° 53' N.
 143° 40' W.



0000 / 31-03-75
 49° 49' N.
 142° 40' W.



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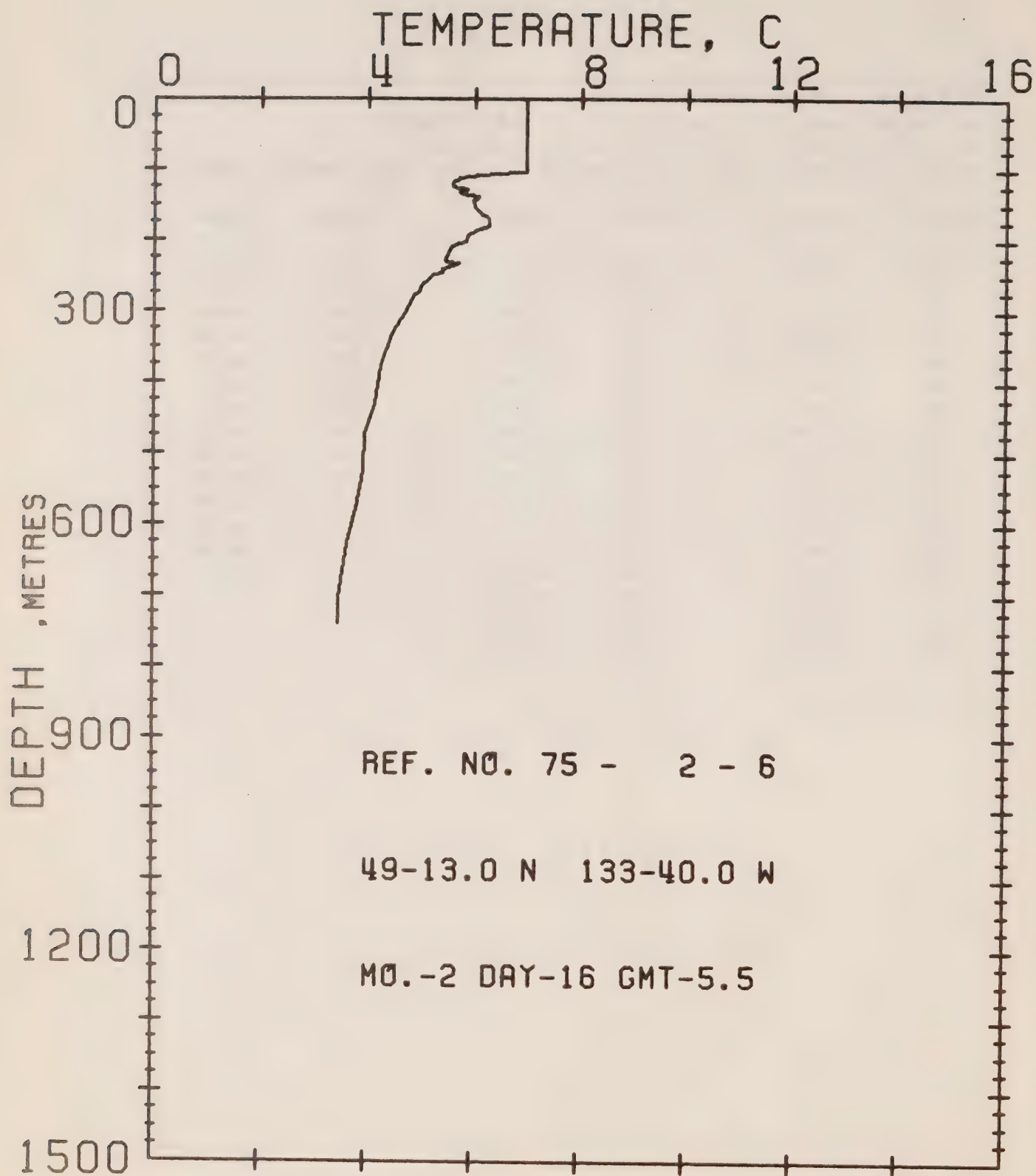
REFERENCE NO. 75- 2- 5

DATE 15/ 2/75

POSITION 49-05.0N 131-40.0W GMT 20.3

RESULTS OF XBT CAST 51 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	7.12	144	6.37	271	4.79
17	7.12	146	6.32	282	4.79
40	7.12	150	6.32	285	4.90
66	7.07	161	6.32	290	4.79
88	7.07	164	6.21	304	4.63
102	7.12	167	6.05	315	4.57
105	6.80	177	5.83	322	4.57
110	6.75	188	5.61	325	4.57
113	6.85	198	5.50	364	4.35
116	6.69	200	5.45	406	4.24
121	6.42	204	5.56	409	4.18
123	6.42	208	5.50	446	4.07
125	6.42	212	5.39	469	3.96
127	6.59	214	5.56		
132	6.64	218	5.45		
135	6.59	224	5.28		
142	6.48	251	5.01		



OFFSHORE OCEANOGRAPHY

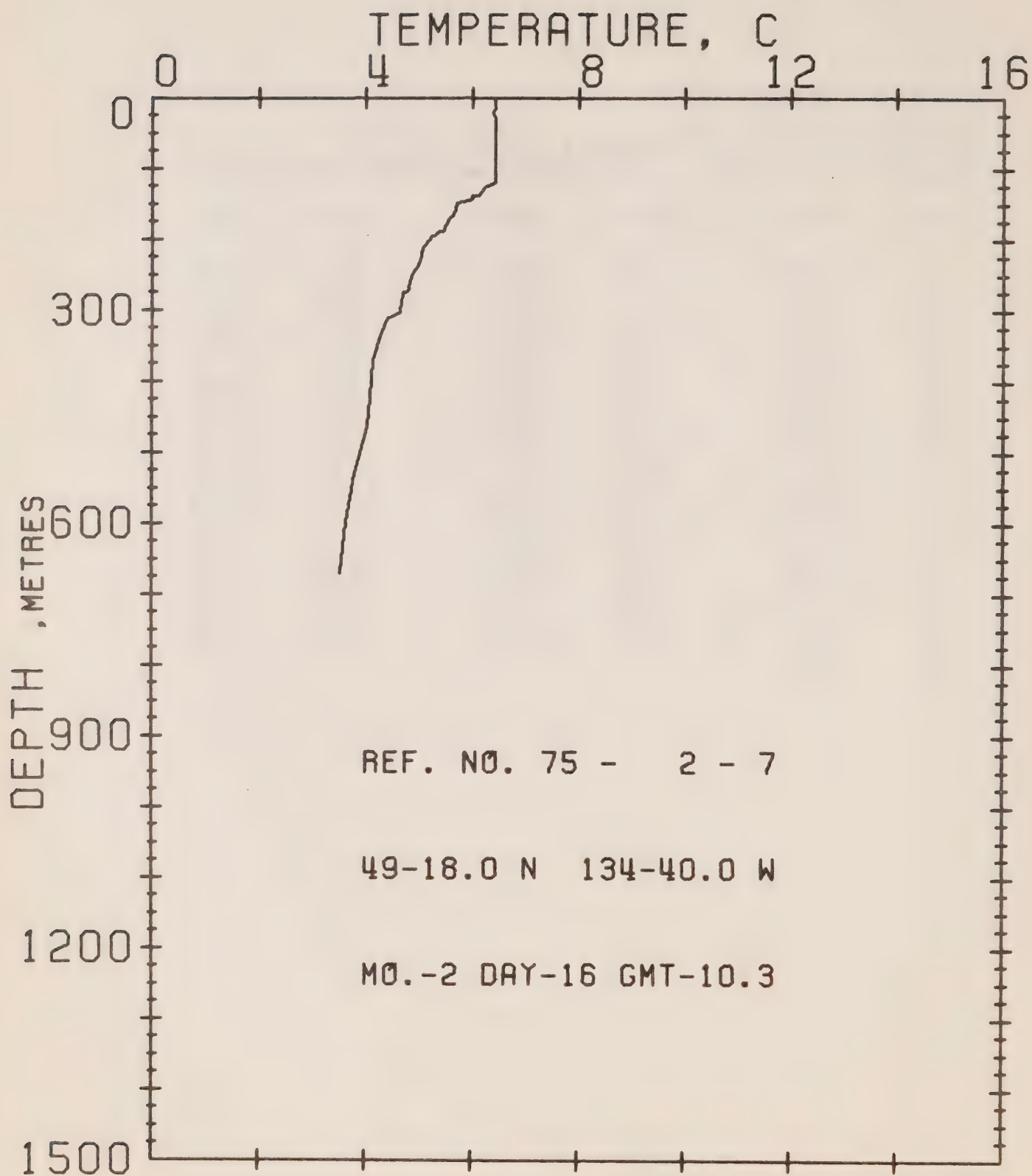
REFERENCE NO. 75- 2- 6

DATE 16/ 2/75

POSITION 49-13.0N 133-40.0W GMT 05.5

RESULTS OF XBT CAST 52 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.96	147	5.94	241	5.39
32	6.96	153	5.99	246	5.39
71	6.96	161	6.10	249	5.23
95	6.96	166	6.21	257	5.12
103	6.96	172	6.26	261	5.01
105	6.80	179	6.26	272	4.96
109	6.10	183	6.10	277	4.85
113	5.72	192	5.88	297	4.74
118	5.61	201	5.83	332	4.46
122	5.56	203	5.72	378	4.24
124	5.56	208	5.56	432	4.13
127	5.88	220	5.50	473	3.96
130	5.77	227	5.45	526	3.91
132	5.72	229	5.50	580	3.80
134	5.77	232	5.72	628	3.63
138	6.05	235	5.56	705	3.46
140	6.05	239	5.50	740	3.46
145	5.94				



OFFSHORE OCEANOGRAPHY

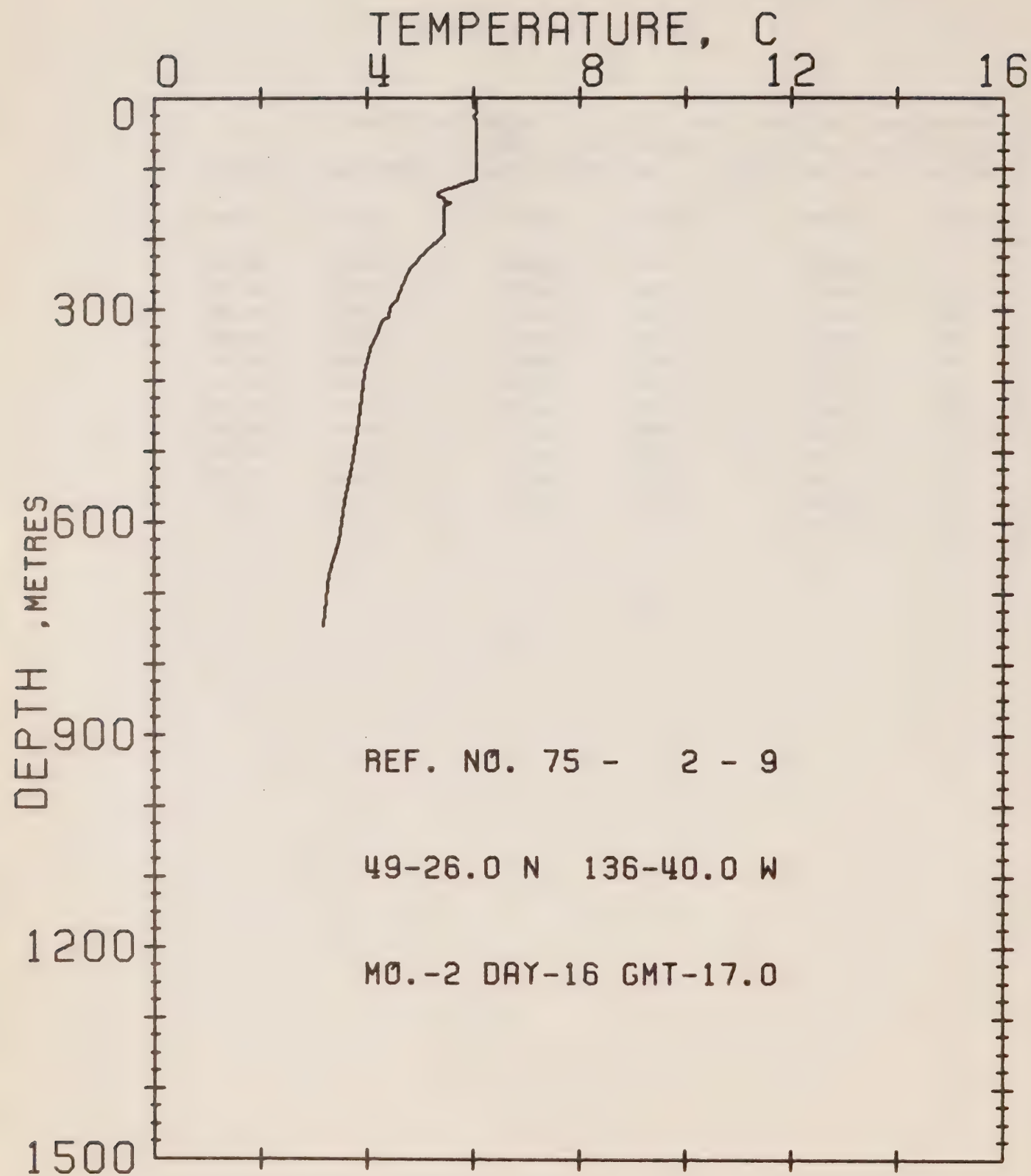
REFERENCE NO. 75- 2- 7

DATE 16/ 2/75

POSITION 49-18.0N 134-40.0W GMT 10.3

RESULTS OF XBT CAST 34 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	6.42	146	5.83	271	4.79
16	6.42	148	5.72	275	4.68
22	6.37	160	5.67	302	4.63
30	6.42	171	5.56	312	4.41
56	6.42	187	5.45	333	4.30
86	6.42	188	5.39	369	4.13
107	6.42	196	5.23	421	4.07
121	6.42	202	5.18	464	4.02
123	6.26	213	5.07	529	3.80
137	6.10	232	5.01	598	3.63
139	5.99	252	4.85	669	3.52
143	5.99				



OFFSHORE OCEANOGRAPHY

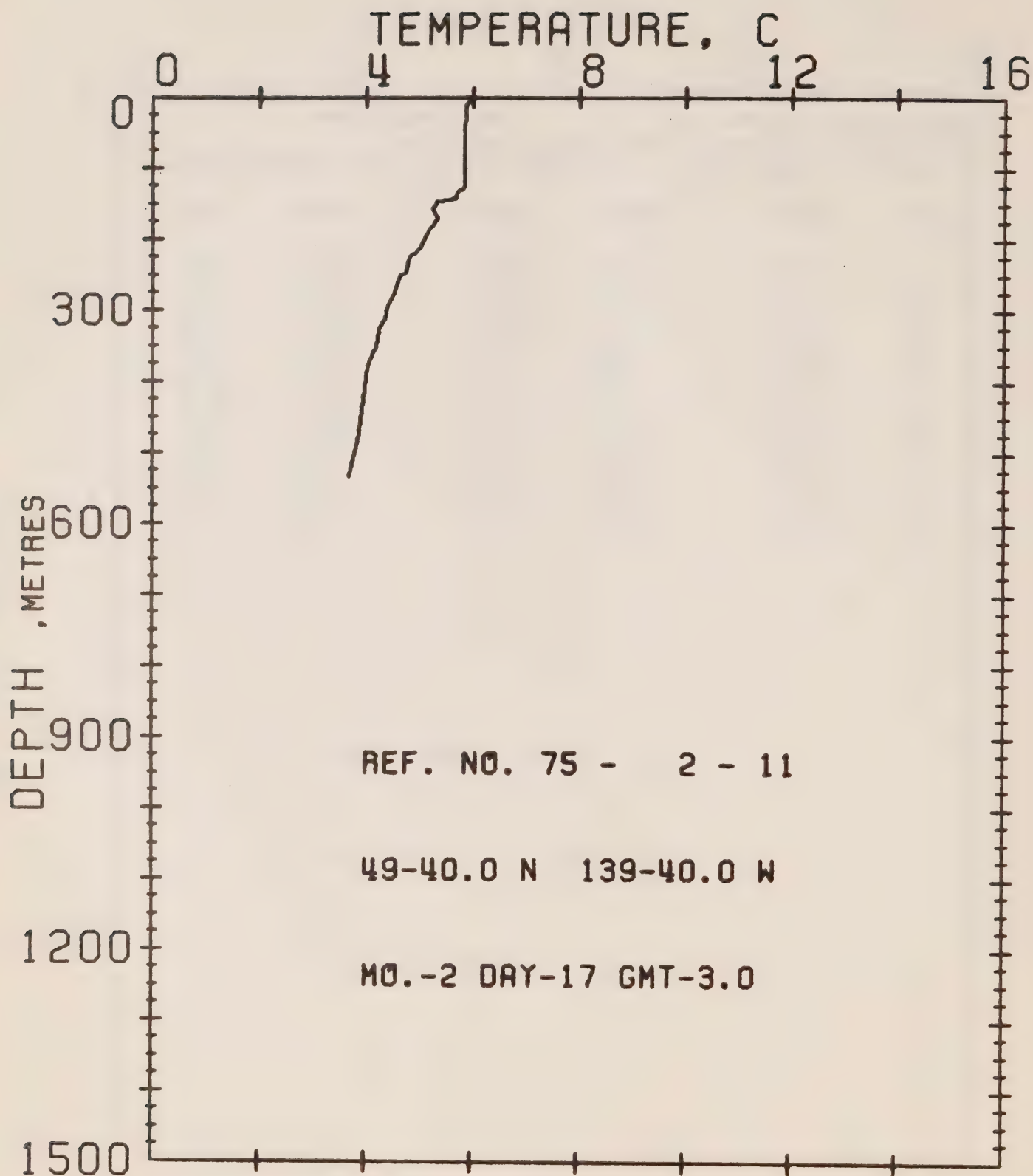
REFERENCE NO. 75- 2- 9

DATE 16/ 2/75

POSITION 49-26.0N 136-40.0W GMT 17.0

RESULTS OF XBT CAST 37 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.05	139	5.34	310	4.41
15	6.05	142	5.45	314	4.30
21	6.05	146	5.45	324	4.24
27	5.99	148	5.56	336	4.18
32	6.05	154	5.45	350	4.07
66	6.05	173	5.45	390	3.96
97	6.05	193	5.45	458	3.85
115	6.05	216	5.12	511	3.74
120	5.88	242	4.79	571	3.57
123	5.72	270	4.63	627	3.46
126	5.67	286	4.57	674	3.29
129	5.45	293	4.46	745	3.18
134	5.34				



OFFSHORE OCEANOGRAPHY

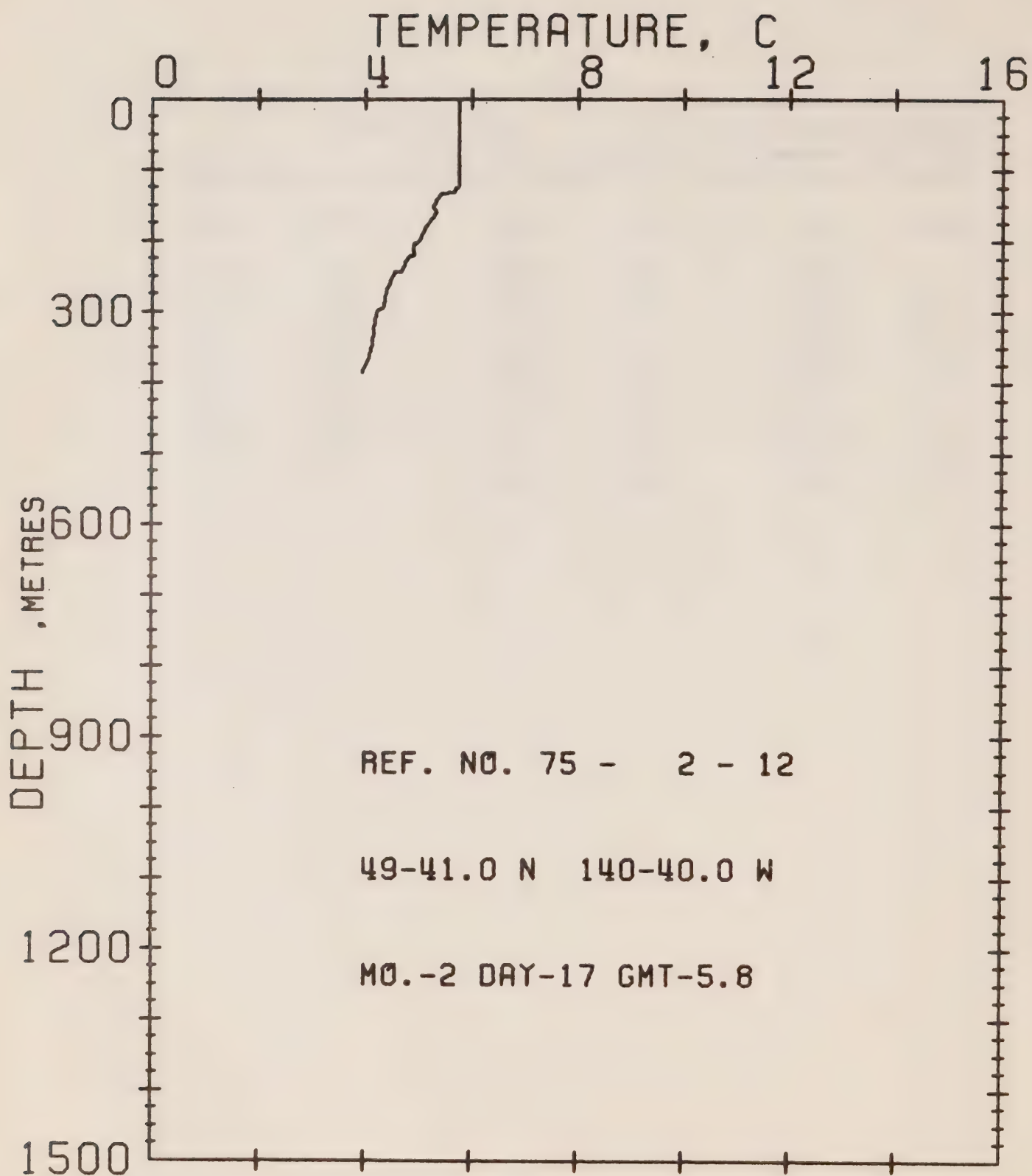
REFERENCE NO. 75- 2- 11

DATE 17/ 2/75

POSITION 49-40.0N 139-40.0W GMT 03.0

RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.94	157	5.23	315	4.35
10	5.88	163	5.28	317	4.30
60	5.83	172	5.34	327	4.24
103	5.83	185	5.18	354	4.18
125	5.83	212	5.01	358	4.13
133	5.72	226	4.79	379	4.02
142	5.67	247	4.74	425	3.96
146	5.39	250	4.63	486	3.85
147	5.34	279	4.52	533	3.68
153	5.28	293	4.41		



OFFSHORE OCEANOGRAPHY

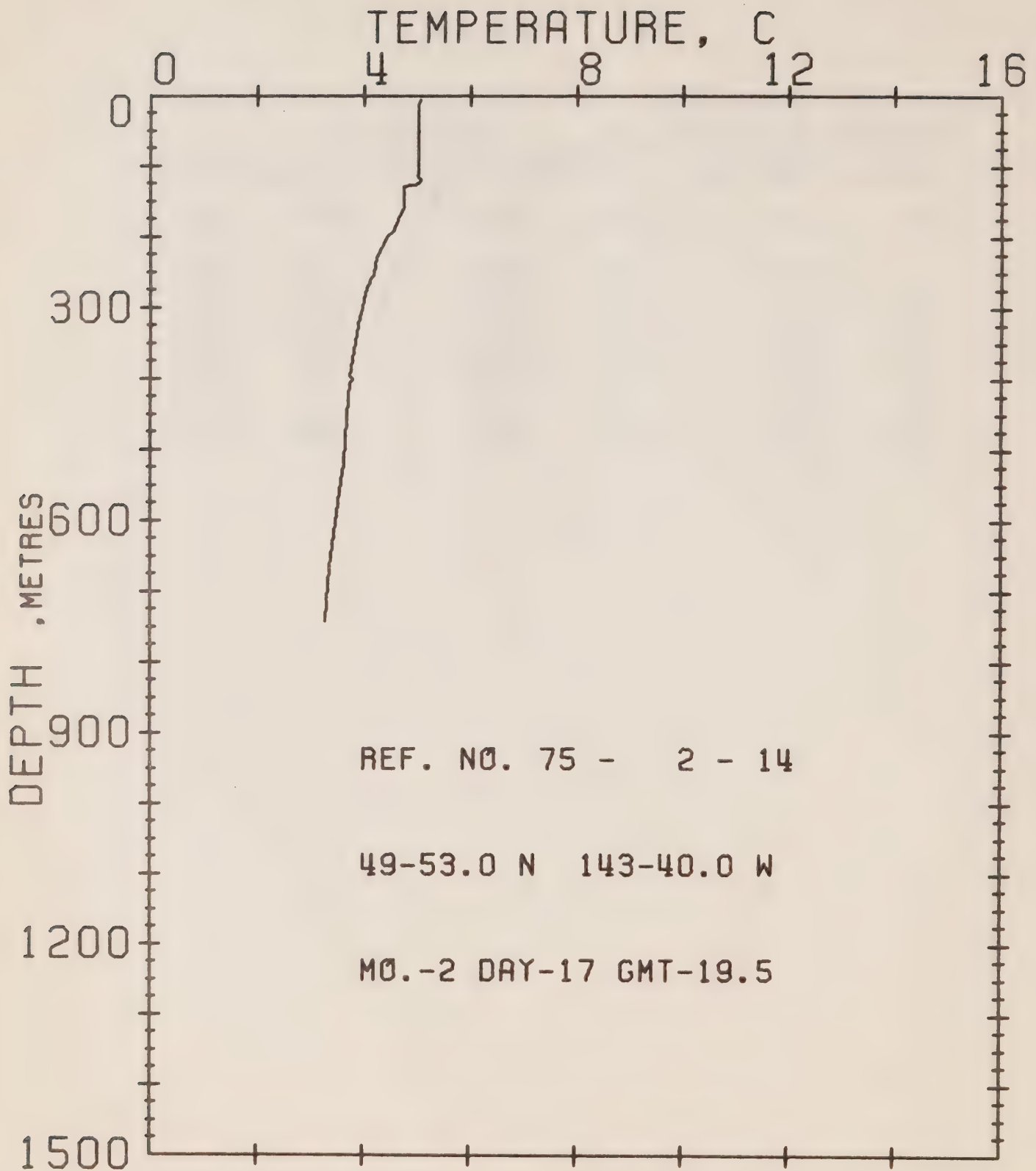
REFERENCE NO. 75- 2- 12

DATE 17/ 2/75

POSITION 49-41.0N 140-40.0W GMT 05.8

RESULTS OF XBT CAST 25 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.77	153	5.28	244	4.57
27	5.77	162	5.34	272	4.41
72	5.77	177	5.18	294	4.35
104	5.77	199	5.01	298	4.24
124	5.77	207	4.90	312	4.18
126	5.72	220	4.90	347	4.13
131	5.67	224	4.79	365	4.07
134	5.45	243	4.68	386	3.96
144	5.34				



OFFSHORE OCEANOGRAPHY

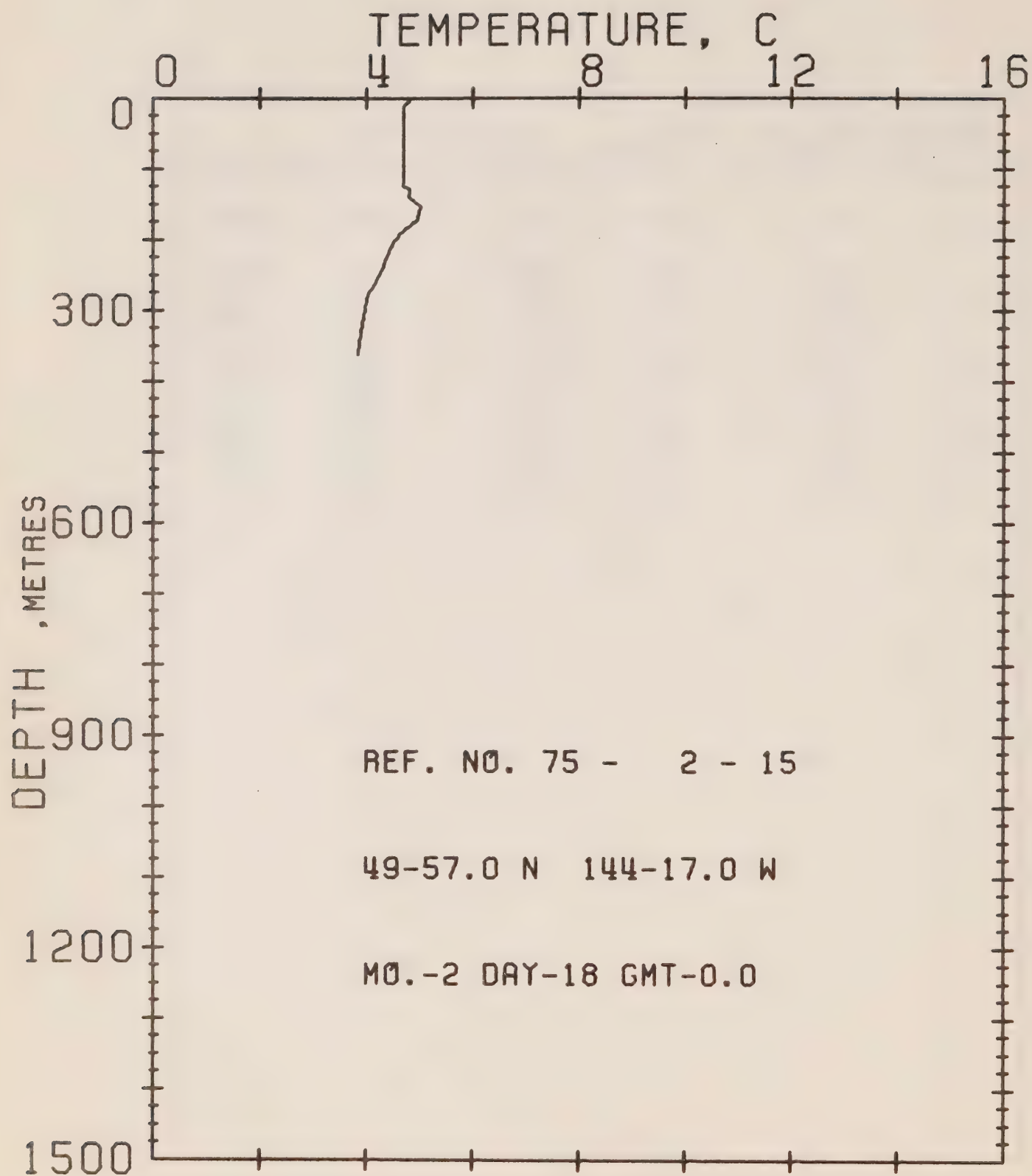
REFERENCE NO. 75- 2- 14

DATE 17/ 2/75

POSITION 49-53.0N 143-40.0W GMT 19.5

RESULTS OF XBT CAST 32 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	5.07	160	4.74	315	3.91
11	5.01	175	4.63	396	3.74
47	5.01	190	4.57	401	3.80
89	5.01	198	4.46	406	3.74
111	5.01	219	4.30	453	3.68
116	5.01	220	4.30	519	3.63
121	5.07	229	4.24	546	3.57
125	4.96	253	4.18	603	3.46
126	4.85	258	4.13	665	3.35
128	4.74	279	4.02	742	3.29
140	4.74	310	3.96		



OFFSHORE OCEANOGRAPHY

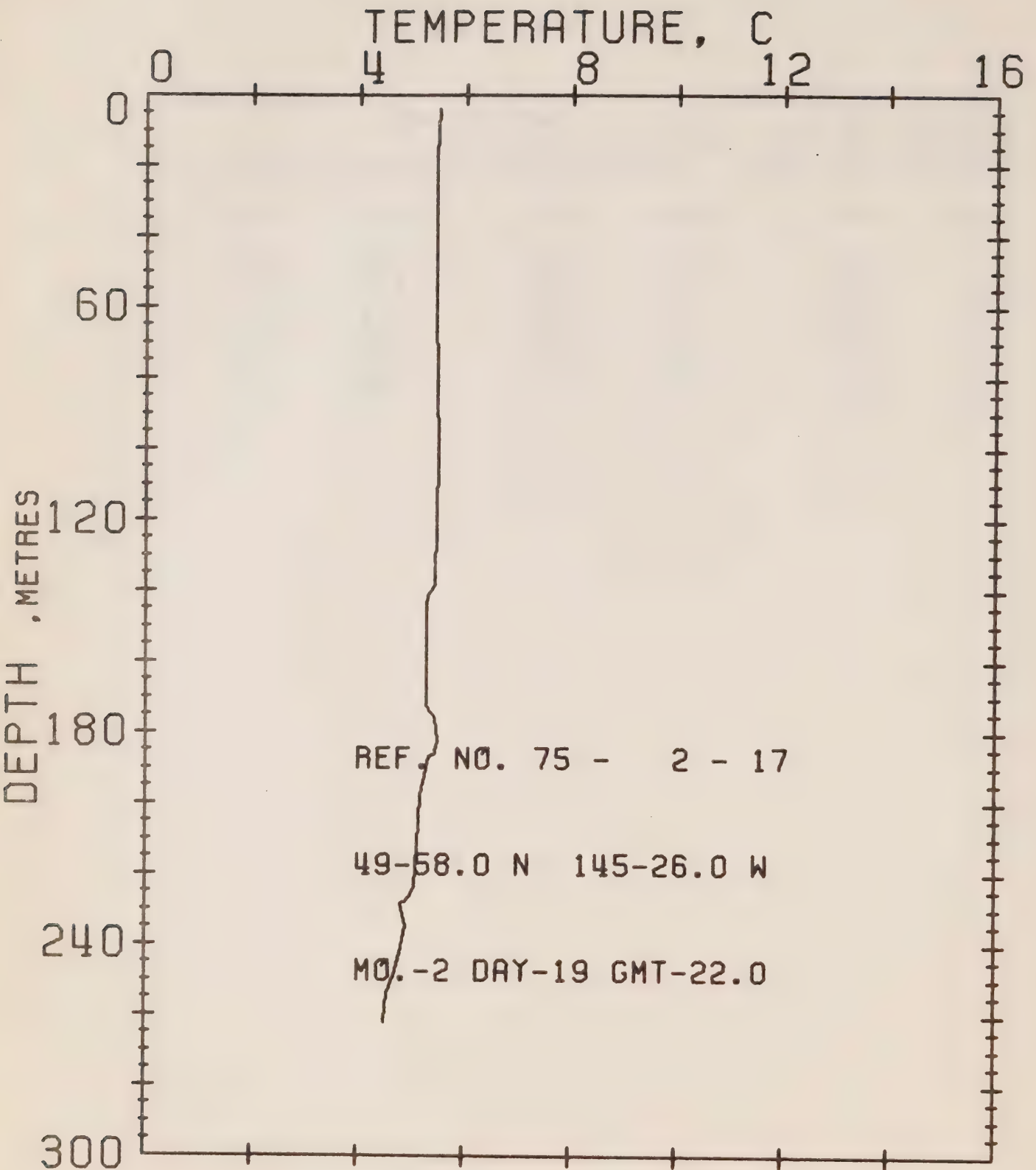
REFERENCE NO. 75- 2- 15

DATE 18/ 2/75

POSITION 49-57.0N 144-17.0W GMT 00.0

RESULTS OF XBT CAST 19 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	4.79	140	4.79	233	4.35
11	4.68	147	4.90	243	4.30
16	4.68	153	5.01	259	4.18
60	4.68	172	4.96	278	4.02
102	4.68	188	4.68	321	3.91
123	4.68	205	4.52	362	3.85
127	4.79				



OFFSHORE OCEANOGRAPHY

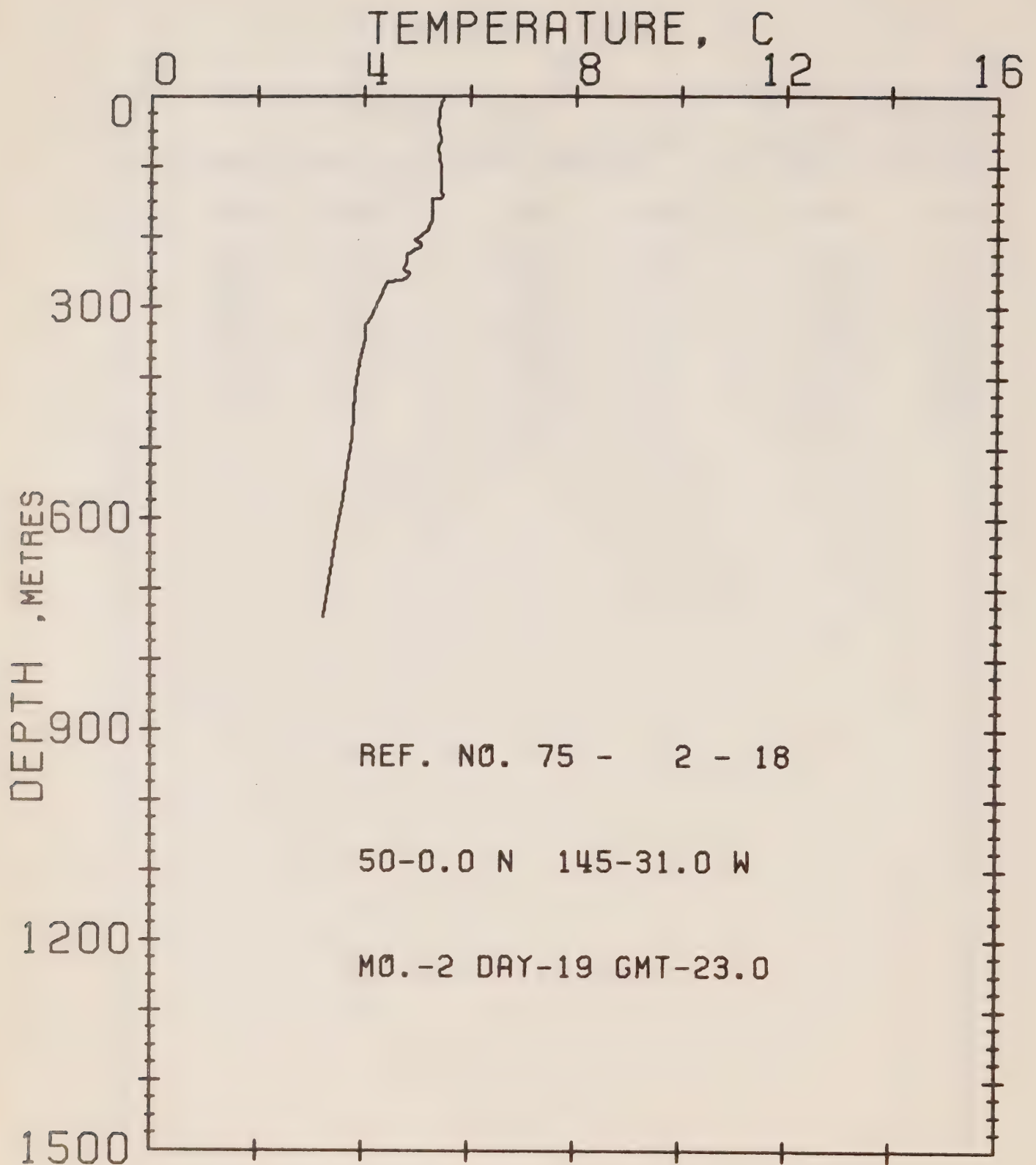
REFERENCE NO. 75- 2- 17

DATE 19/ 2/75

POSITION 49-58.0N 145-26.0W GMT 22.0

RESULTS OF XBT CAST 23 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.50	173	5.28	227	4.96
18	5.45	176	5.45	229	4.79
60	5.45	183	5.50	235	4.90
102	5.50	186	5.45	243	4.79
139	5.45	187	5.34	249	4.68
141	5.34	198	5.18	254	4.57
144	5.28	212	5.12	262	4.52
168	5.28	224	5.07		



OFFSHORE OCEANOGRAPHY

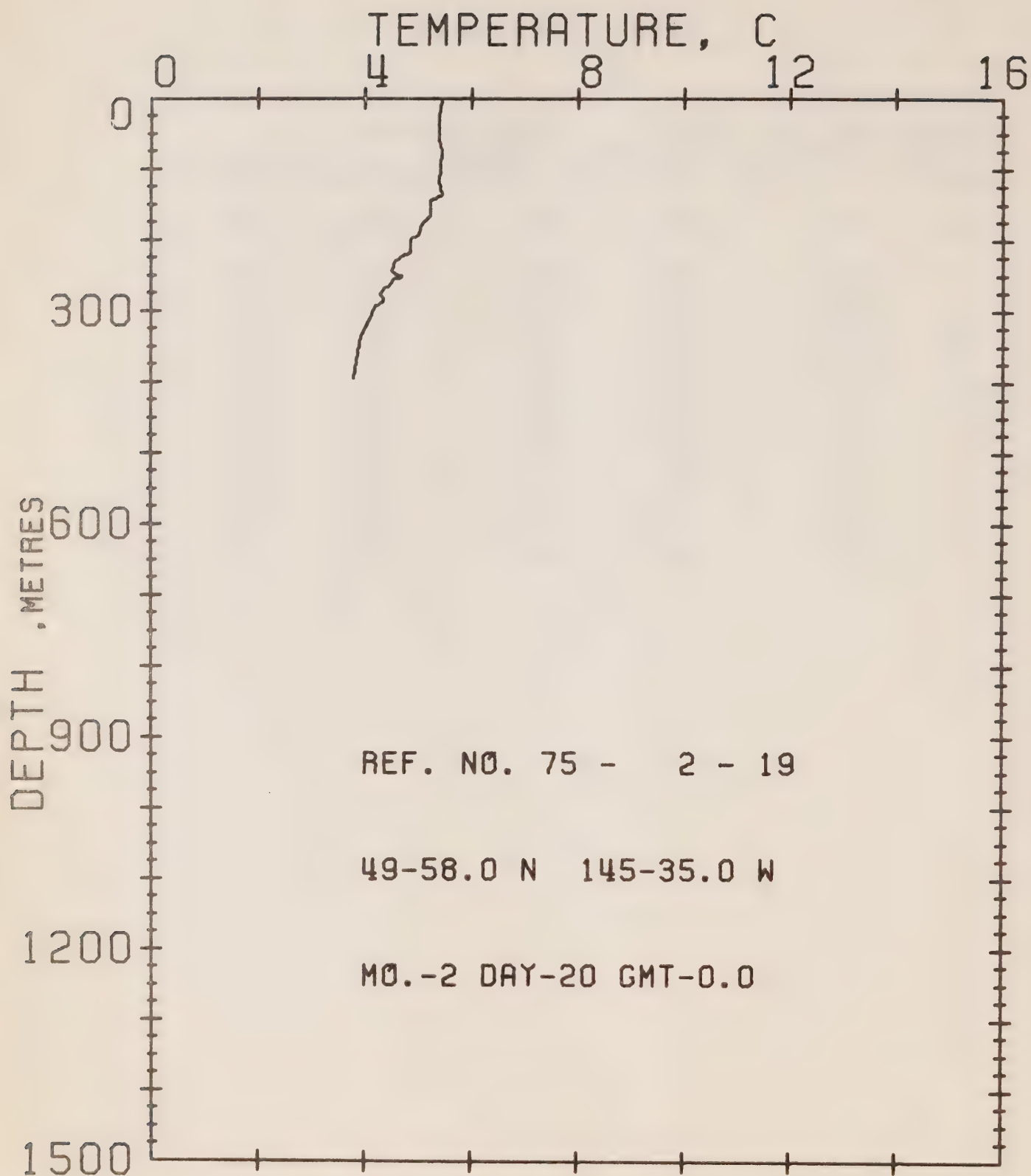
REFERENCE NO. 75- 2- 18

DATE 19/ 2/75

POSITION 50-00.0N 145-31.0W GMT 23.0

RESULTS OF XBT CAST 39 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	5.50	191	5.18	265	4.46
9	5.45	202	5.01	281	4.35
40	5.39	205	4.96	316	4.13
63	5.45	209	5.07	326	4.02
74	5.39	214	5.07	345	4.02
102	5.45	217	4.96	379	3.91
118	5.45	226	4.79	419	3.85
137	5.45	237	4.79	485	3.80
140	5.50	246	4.74	540	3.68
145	5.45	251	4.85	571	3.63
147	5.28	254	4.85	612	3.52
163	5.28	258	4.79	690	3.35
178	5.28	261	4.68	740	3.24



OFFSHORE OCEANOGRAPHY

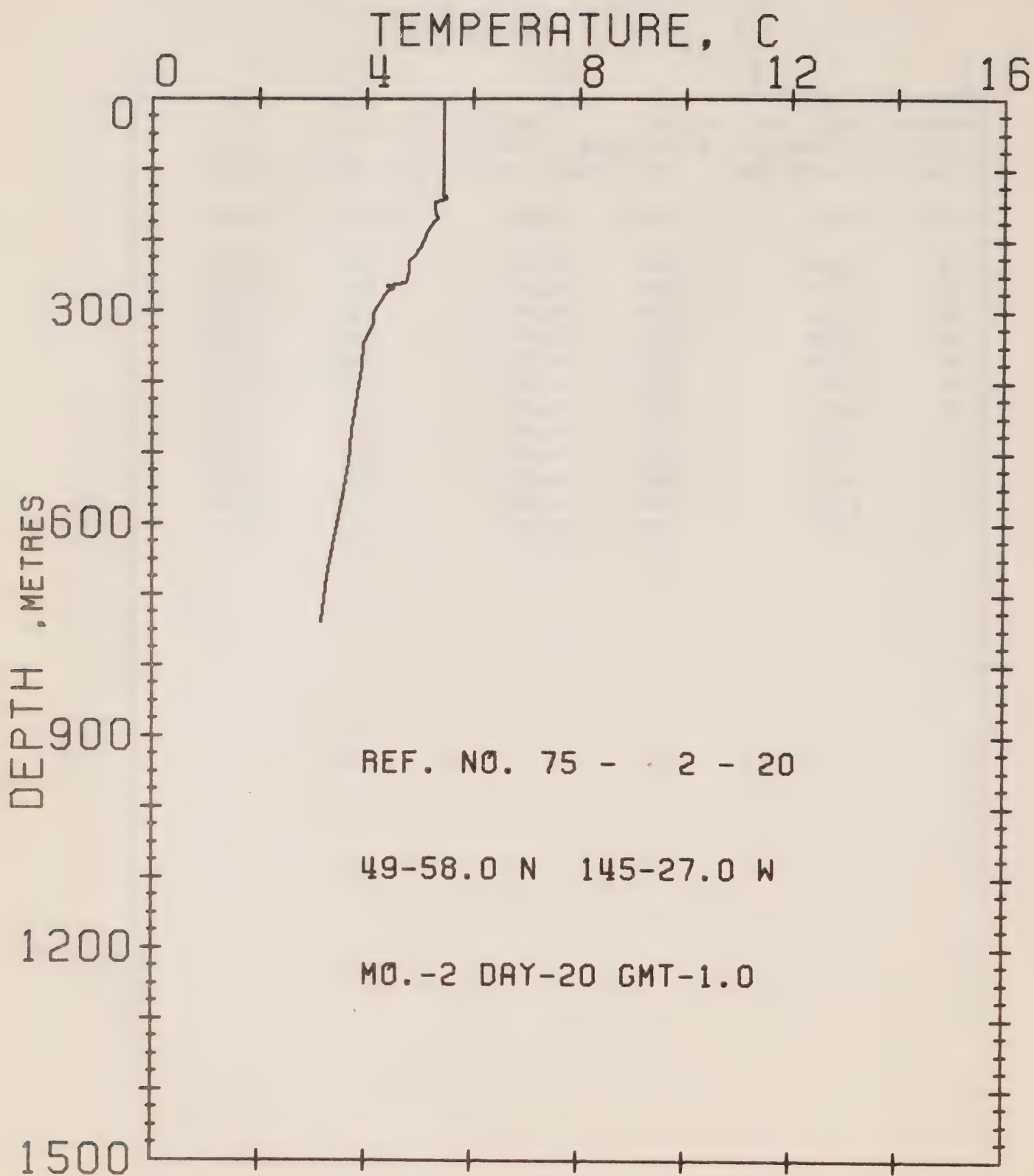
REFERENCE NO. 75- 2- 19

DATE 20/ 2/75

POSITION 49-58.0N 145-35.0W GMT 00.0

RESULTS OF XBT CAST 36 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.45	195	4.90	277	4.30
28	5.39	199	4.85	278	4.30
60	5.39	207	4.85	282	4.35
75	5.45	217	4.85	286	4.35
120	5.39	220	4.74	288	4.30
136	5.45	231	4.57	293	4.18
139	5.39	243	4.52	303	4.13
144	5.23	251	4.68	315	4.07
164	5.23	253	4.63	322	4.02
165	5.23	255	4.57	335	3.91
177	5.07	265	4.46	372	3.85
192	5.01	268	4.35	393	3.80



OFFSHORE OCEANOGRAPHY

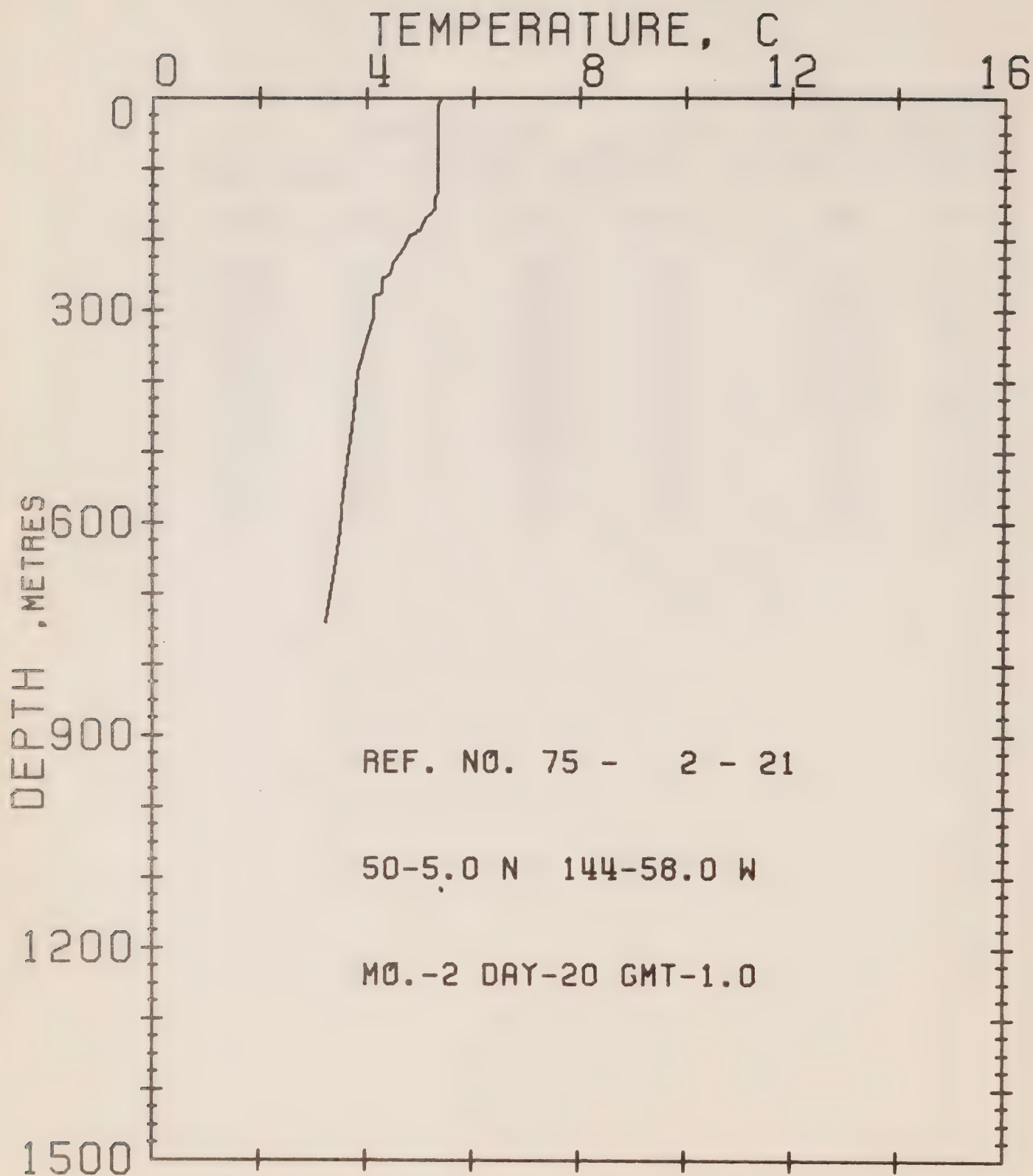
REFERENCE NO. 75- 2- 20

DATE 20/ 2/75

POSITION 49-58.0N 145-27.0W GMT 01.0

RESULTS OF XBT CAST 34 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.45	205	5.07	304	4.13
38	5.45	212	5.01	319	4.13
79	5.45	214	4.96	345	3.96
123	5.45	217	4.96	381	3.91
137	5.45	230	4.79	418	3.85
139	5.50	245	4.79	469	3.74
143	5.50	260	4.74	515	3.68
147	5.28	265	4.41	562	3.57
159	5.28	267	4.52	622	3.41
169	5.34	273	4.41	676	3.29
174	5.28	278	4.35	738	3.18
184	5.18				



OFFSHORE OCEANOGRAPHY

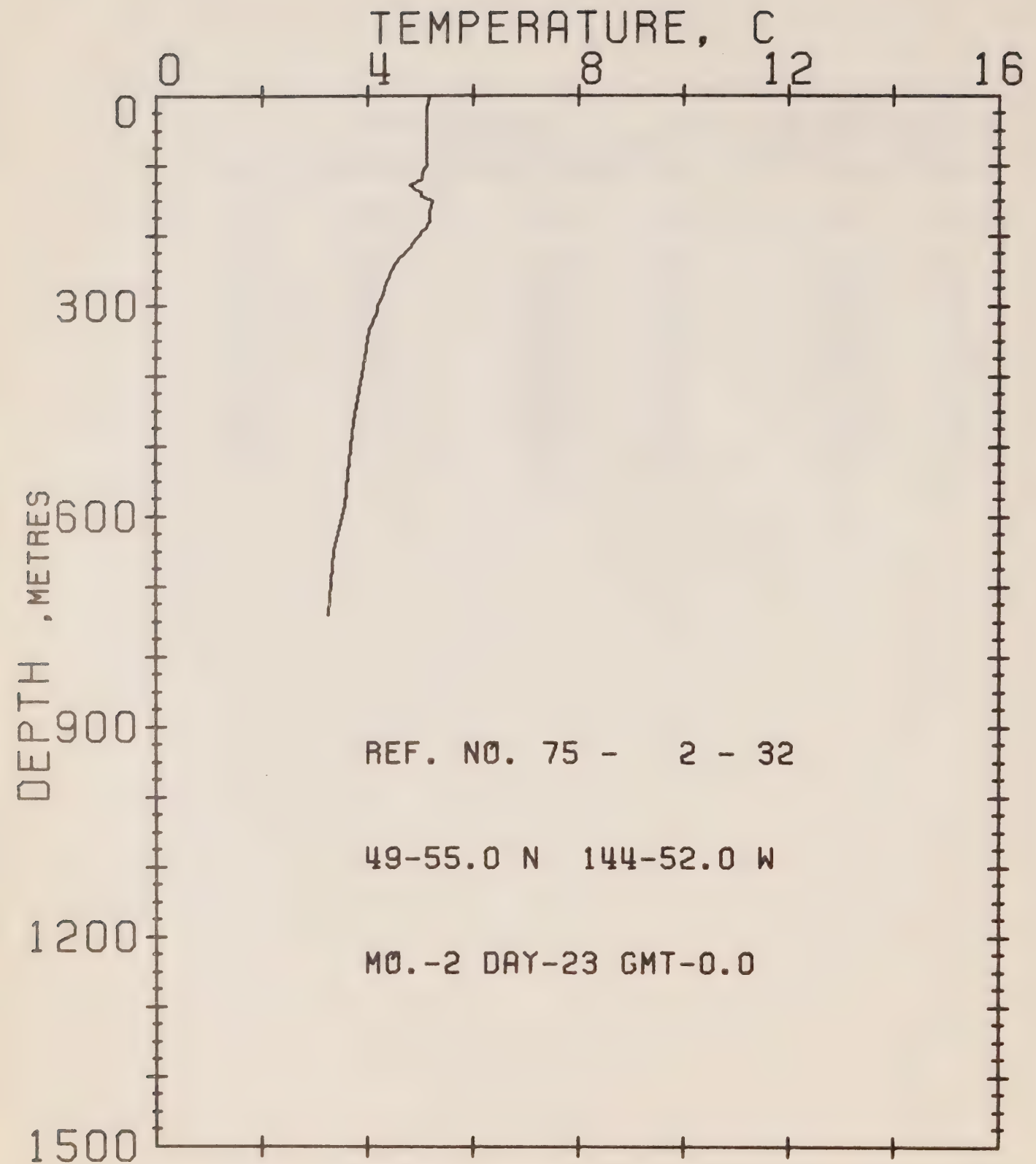
REFERENCE NO. 75- 2- 21

DATE 20/ 2/75

POSITION 50-05.0N 144-58.0W GMT 01.0

RESULTS OF XBT CAST 27 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.39	186	5.01	312	4.13
11	5.34	196	4.79	338	4.02
49	5.34	214	4.68	388	3.85
80	5.34	232	4.52	435	3.80
110	5.34	248	4.46	498	3.68
135	5.34	256	4.30	559	3.57
142	5.28	270	4.30	612	3.52
157	5.28	275	4.30	667	3.41
171	5.12	280	4.13	740	3.24



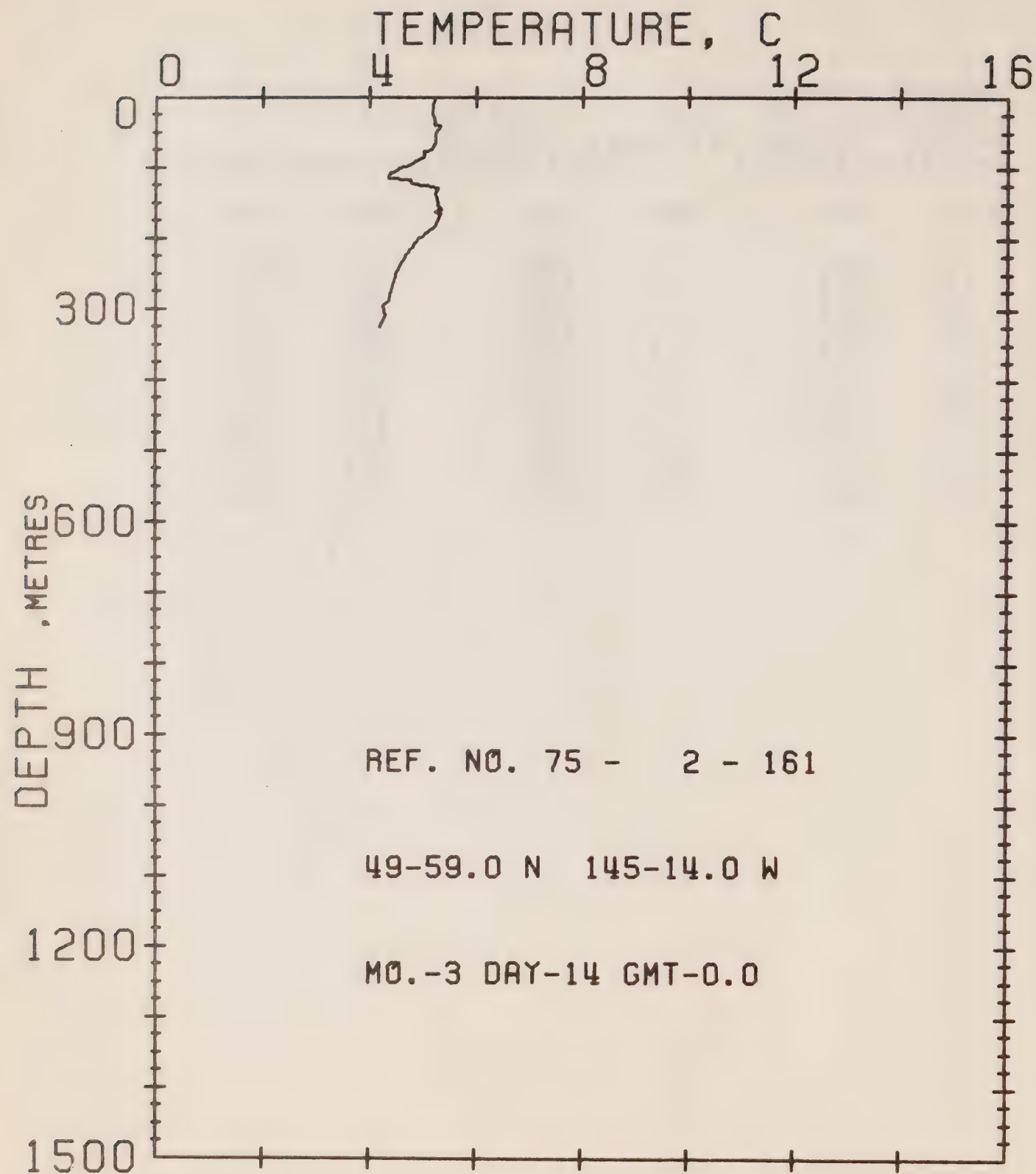
OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 2- 32 DATE 23/ 2/75

POSITION 49-55.0N 144-52.0W GMT 00.0

RESULTS OF XBT CAST 33 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.18	137	5.01	270	4.35
19	5.12	144	5.01	285	4.30
76	5.12	146	5.12	300	4.18
102	5.12	151	5.23	308	4.18
104	5.07	168	5.18	335	4.02
106	5.07	181	5.18	389	3.91
120	5.01	192	5.07	465	3.74
124	4.90	207	4.90	540	3.63
128	4.79	218	4.79	586	3.57
132	4.85	229	4.63	649	3.35
136	4.96	242	4.52	740	3.24



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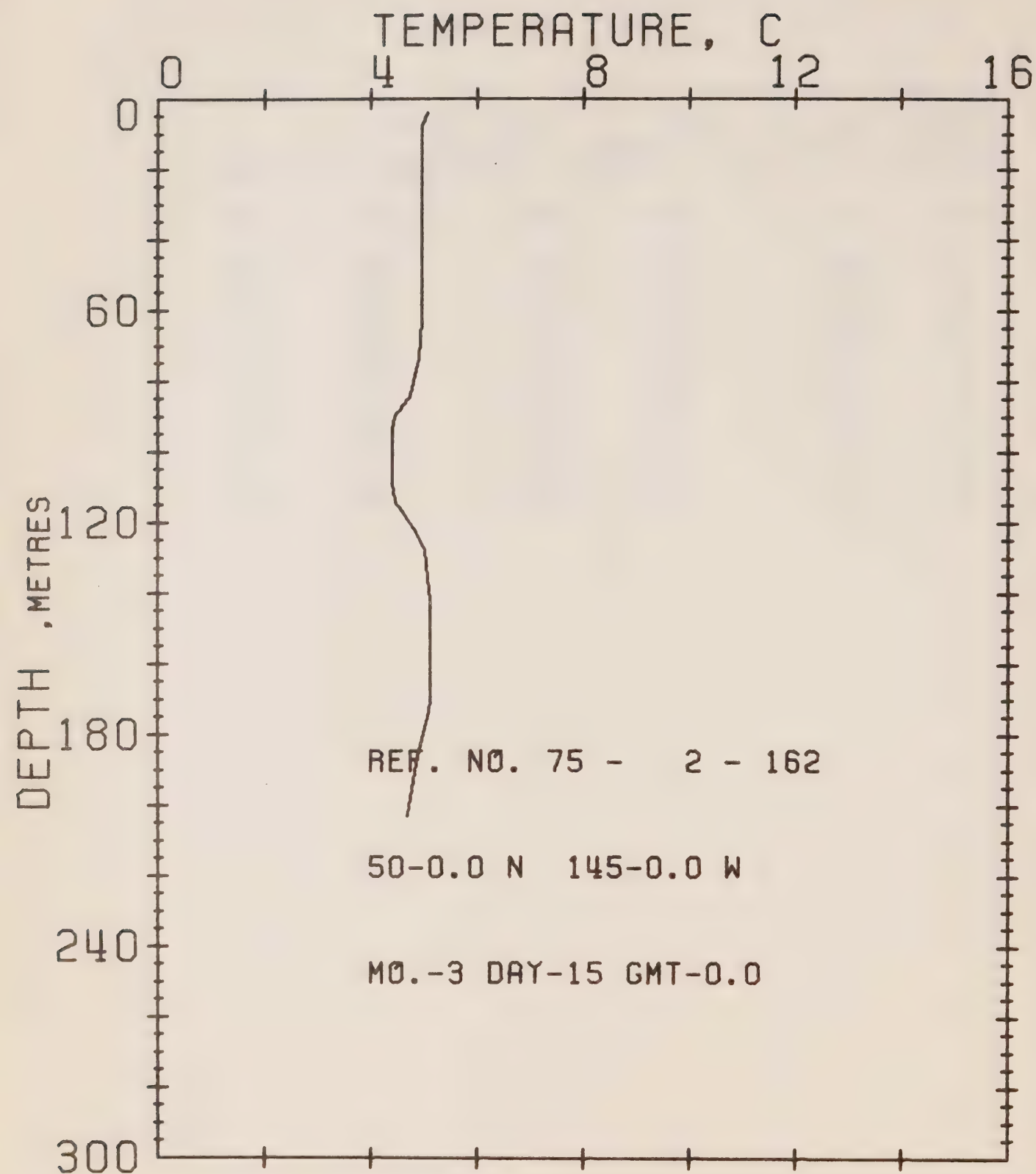
REFERENCE NO. 75- 2-161

DATE 14/ 3/75

POSITION 49-59.0N 145-14.0W GMT 00.0

RESULTS OF XBT CAST 34 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.23	99	4.57	162	5.23
11	5.18	104	4.52	164	5.34
23	5.18	106	4.41	182	5.23
37	5.23	114	4.35	200	4.90
40	5.34	117	4.74	222	4.68
52	5.23	122	4.79	246	4.52
65	5.23	124	5.07	274	4.41
74	5.18	128	5.28	287	4.35
76	5.01	139	5.23	295	4.24
84	5.01	155	5.28	310	4.30
89	4.85	158	5.34	324	4.18
95	4.74				



OFFSHORE OCEANOGRAPHY

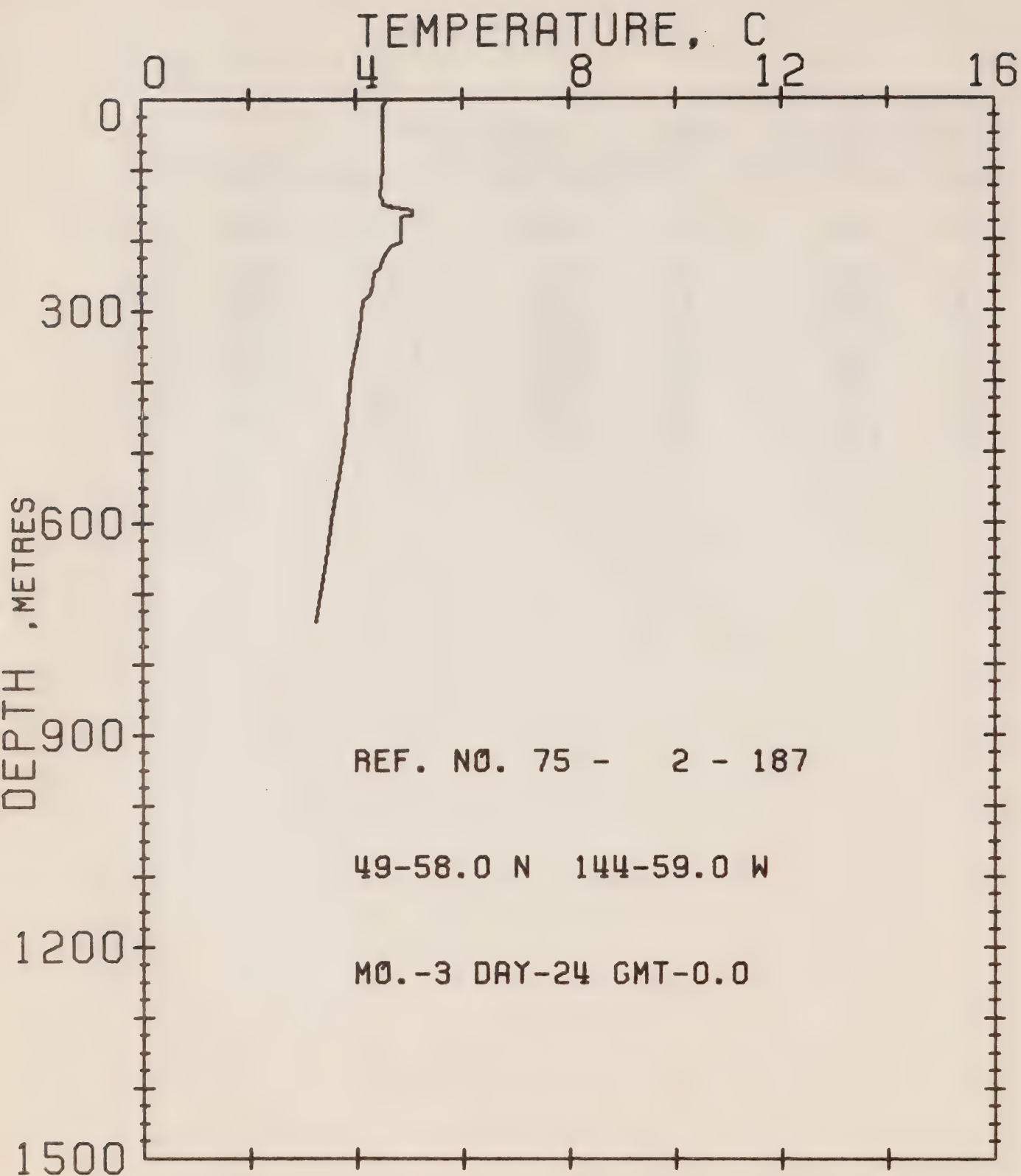
REFERENCE NO. 75- 2-152

DATE 15/ 3/75

POSITION 50-00.0N 145-00.0W GMT 00.0

RESULTS OF XBT CAST 23 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.07	94	4.41	142	5.12
8	4.96	103	4.41	159	5.12
39	4.96	109	4.41	166	5.12
63	4.96	114	4.46	171	5.12
74	4.90	118	4.63	175	5.07
77	4.85	123	4.85	188	4.85
84	4.74	128	5.01	203	4.68
90	4.46	136	5.07		



OFFSHORE OCEANOGRAPHY

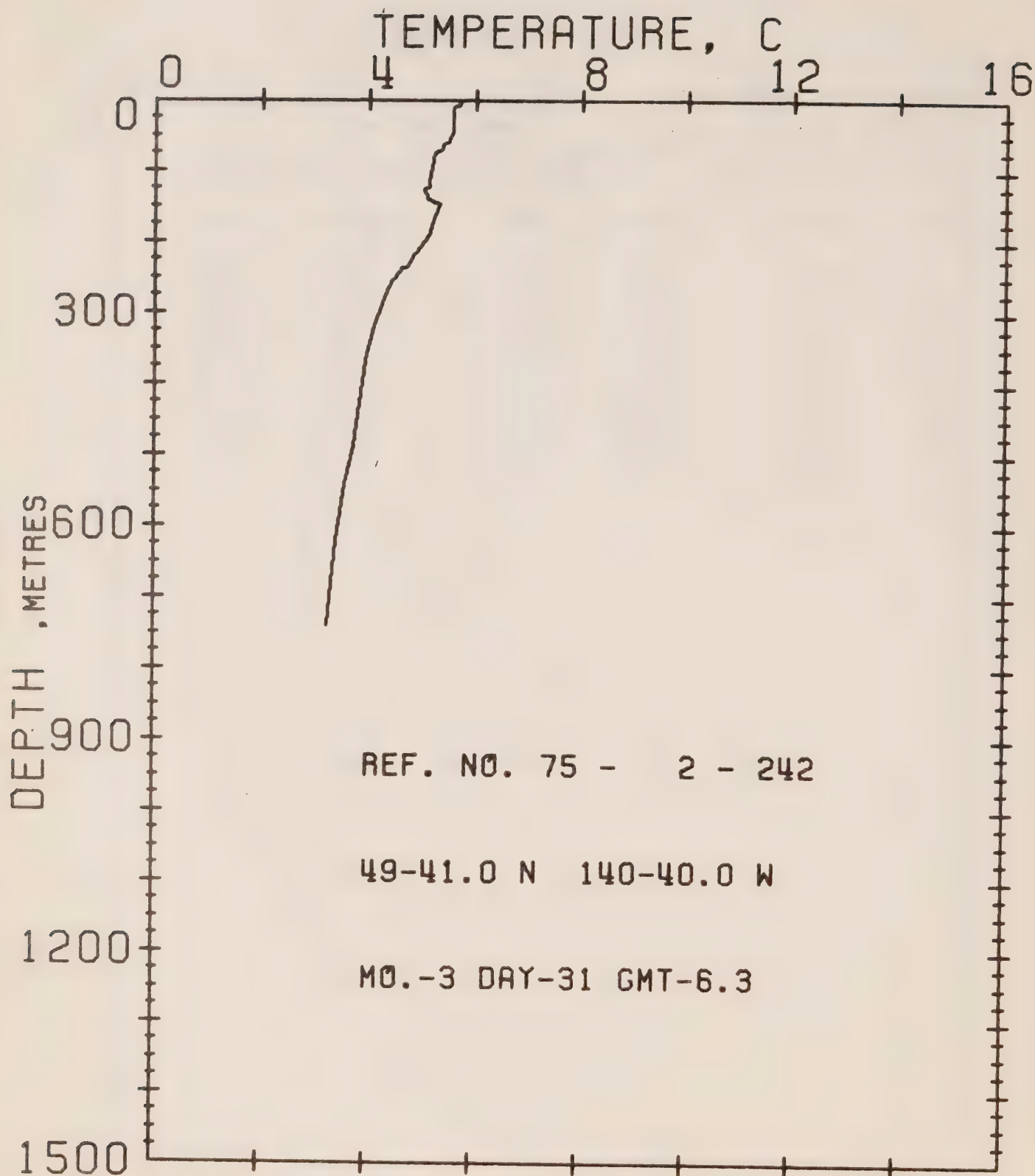
REFERENCE NO. 75- 2-187

DATE 24/ 3/75

POSITION 49-58.0N 144-59.0W GMT 00.0

RESULTS OF XBT CAST 28 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	4.57	165	5.07	248	4.35
9	4.52	166	4.90	276	4.30
52	4.52	168	4.85	288	4.13
101	4.52	177	4.85	327	4.07
138	4.46	193	4.85	386	3.91
146	4.52	204	4.85	489	3.80
150	4.52	208	4.68	584	3.57
153	4.74	221	4.57	667	3.41
156	4.96	240	4.46	739	3.24
158	5.07				



OFFSHORE OCEANOGRAPHY

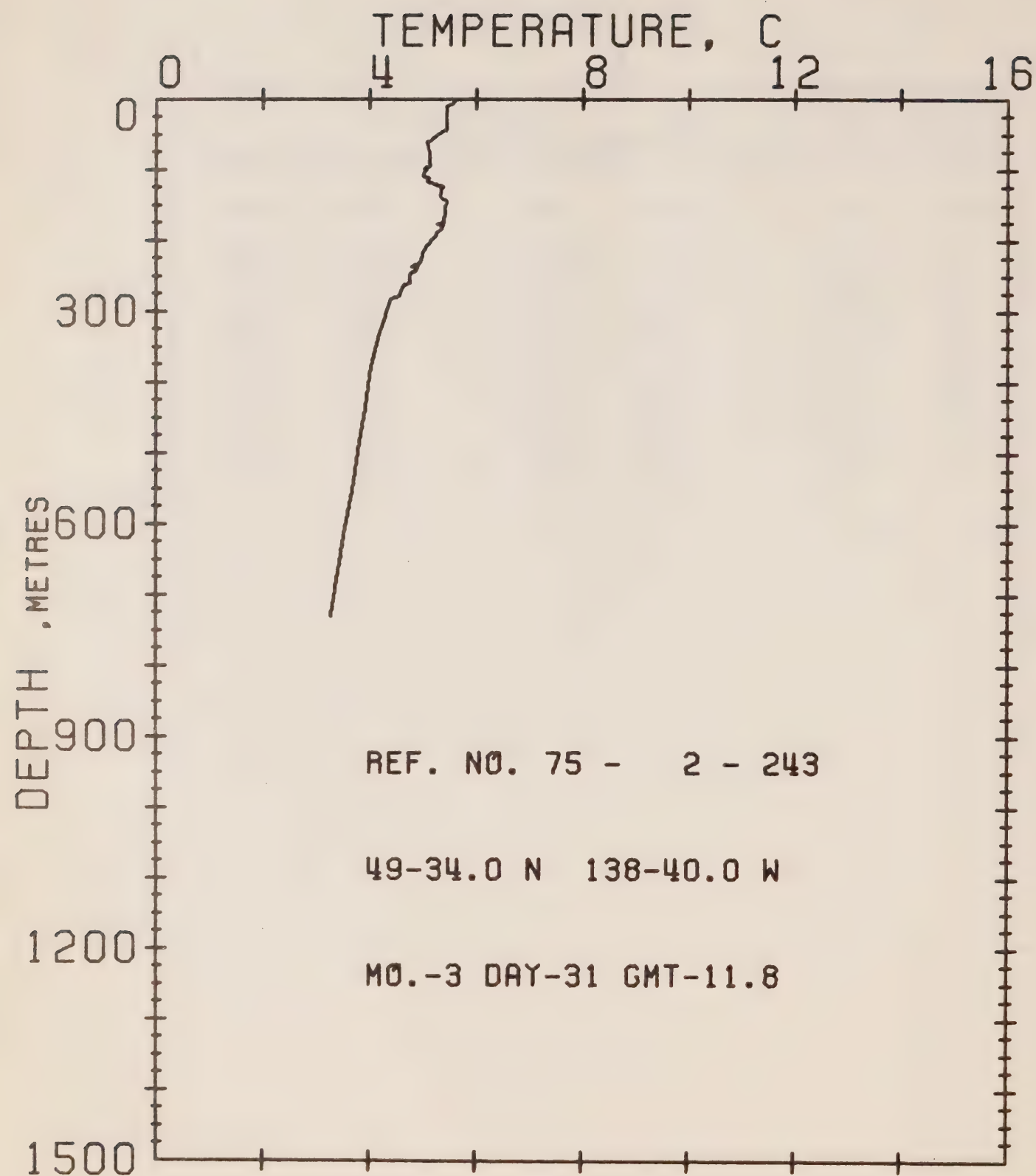
REFERENCE NO. 75- 2-242

DATE 31/ 3/75

POSITION 49-41.0N 140-40.0W GMT 06.3

RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.72	116	5.12	235	4.63
9	5.61	122	5.12	260	4.41
15	5.56	125	5.01	279	4.30
45	5.56	133	5.07	325	4.07
57	5.50	140	5.12	368	3.96
62	5.39	147	5.34	427	3.85
68	5.39	167	5.23	488	3.74
71	5.28	191	5.12	541	3.57
74	5.23	218	4.85	621	3.41
95	5.18	234	4.74	739	3.24



OFFSHORE OCEANOGRAPHY

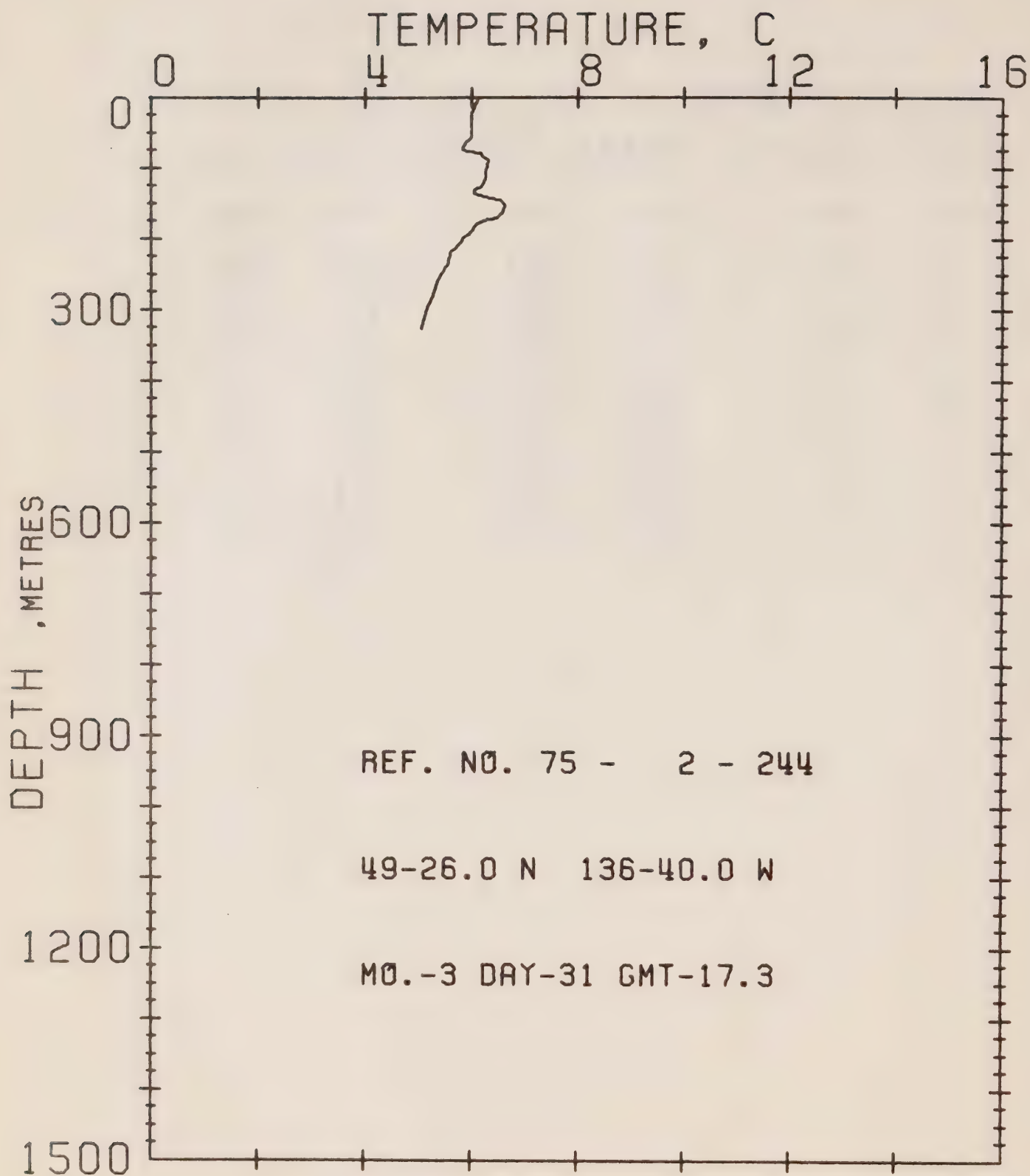
REFERENCE NO. 75- 2-243

DATE 31/ 3/75

POSITION 49-34.0N 138-40.0W GMT 11.8

RESULTS OF XBT CAST 40 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.61	120	5.23	248	4.74
9	5.45	123	5.39	259	4.74
27	5.45	126	5.34	262	4.63
41	5.45	138	5.34	278	4.57
50	5.29	144	5.45	282	4.41
61	5.07	173	5.39	332	4.18
78	5.12	175	5.28	377	4.02
93	5.12	178	5.39	435	3.91
98	5.01	198	5.18	497	3.80
100	5.07	214	5.01	553	3.68
103	5.01	231	4.96	616	3.52
108	5.01	235	4.79	642	3.46
111	5.12	239	4.90	730	3.29
116	5.07				



OFFSHORE OCEANOGRAPHY

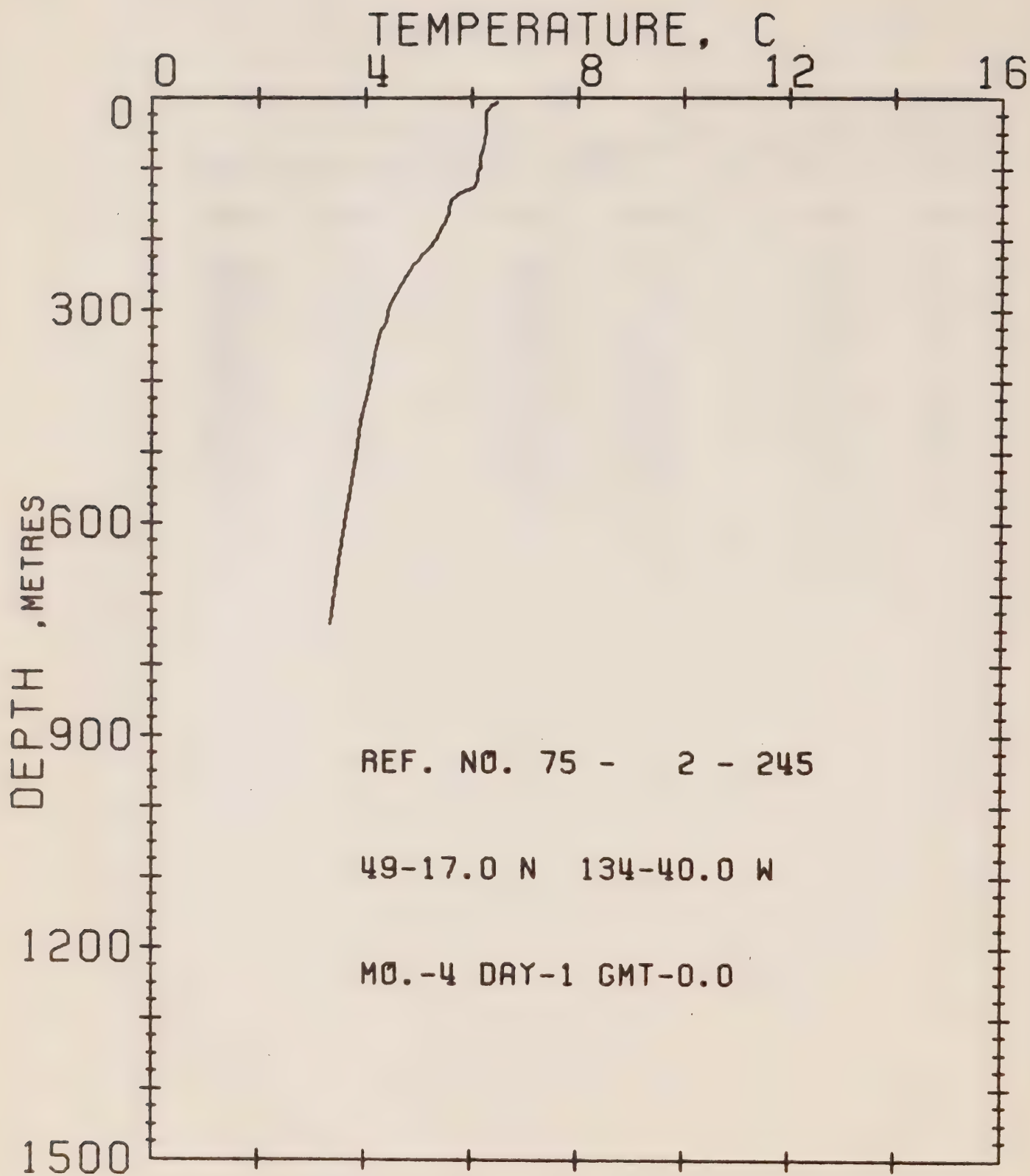
REFERENCE NO. 75- 2-244

DATE 31/ 3/75

POSITION 49-26.0N 136-40.0W GMT 17.3

RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.10	124	6.21	178	6.10
24	5.99	129	6.05	190	5.99
55	5.99	135	6.05	198	5.88
65	5.88	139	6.15	208	5.77
73	5.83	141	6.37	221	5.61
75	5.94	144	6.53	234	5.56
78	6.15	153	6.64	256	5.39
90	6.32	163	6.59	279	5.28
103	6.26	169	6.48	299	5.18
116	6.26	173	6.21	325	5.07



OFFSHORE OCEANOGRAPHY

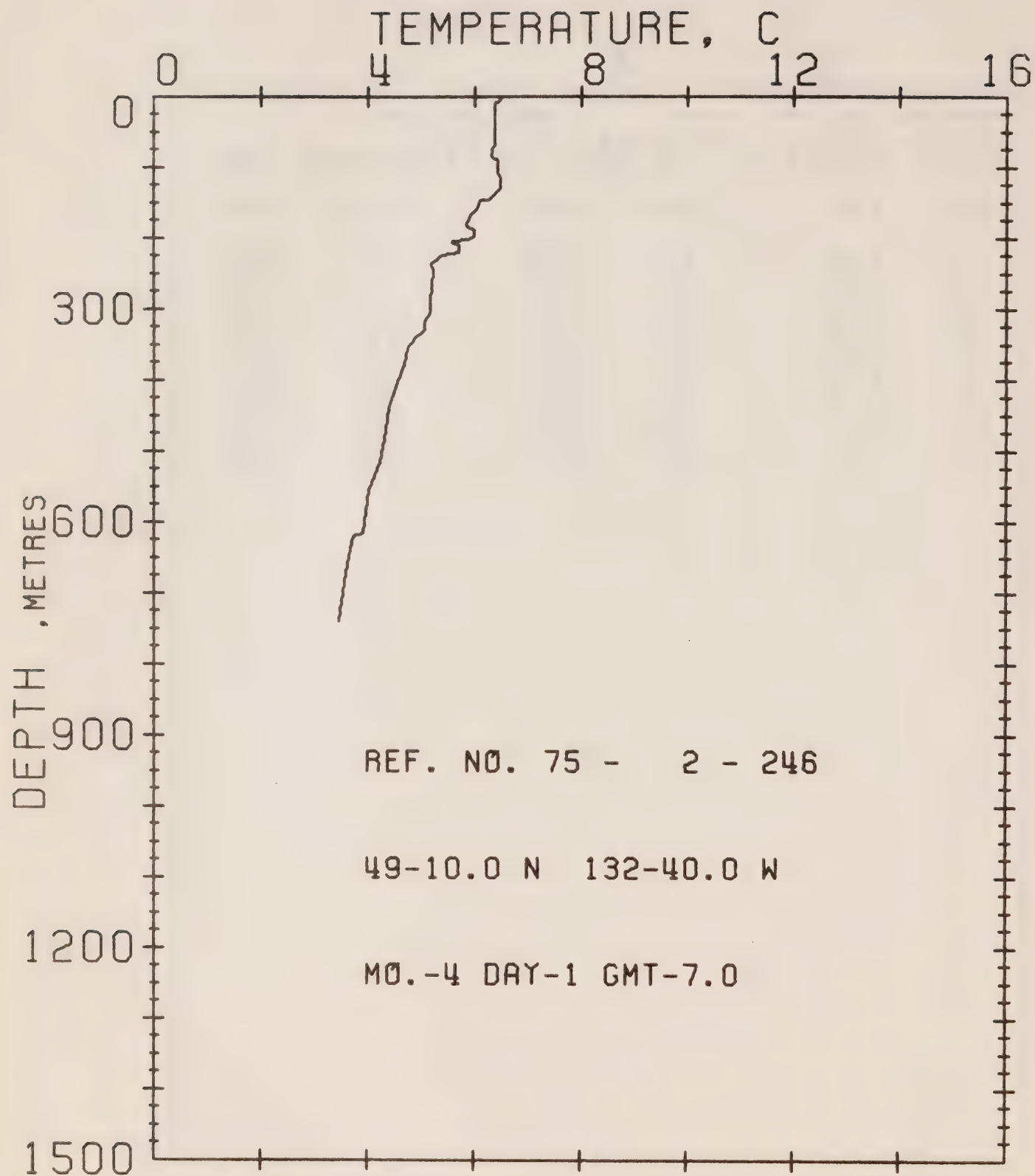
REFERENCE NO. 75- 2-245

DATE 01/ 4/75

POSITION 49-17.0N 134-40.0W GMT 00.0

RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	6.48	131	5.83	293	4.46
9	6.37	137	5.72	317	4.41
20	6.26	146	5.61	327	4.30
49	6.26	162	5.56	363	4.18
71	6.21	177	5.50	408	4.07
84	6.15	181	5.45	458	3.91
100	6.15	199	5.34	506	3.85
104	6.10	214	5.18	575	3.68
118	6.10	236	4.90	653	3.52
125	6.05	261	4.68	742	3.35



OFFSHORE OCEANOGRAPHY

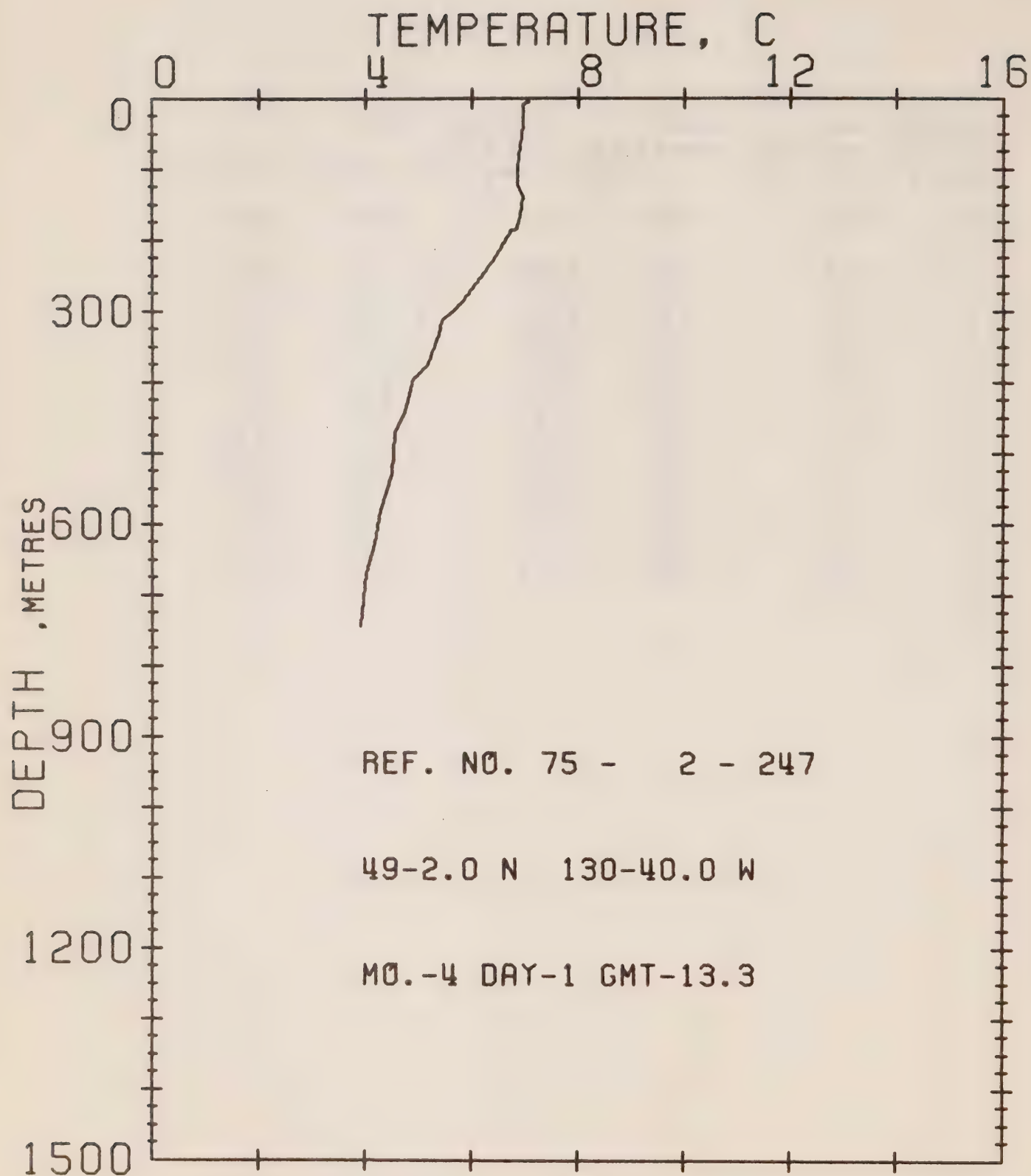
REFERENCE NO. 75- 2-246

DATE 01/ 4/75

POSITION 49-10.0N 132-40.0W GMT 07.0

RESULTS OF XBT CAST 43 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	6.48	175	5.88	317	5.07
9	6.37	182	5.83	331	5.07
47	6.37	187	5.99	340	4.90
69	6.37	197	5.99	356	4.74
73	6.32	202	5.88	377	4.68
84	6.32	205	5.61	404	4.57
89	6.42	207	5.56	440	4.41
107	6.42	210	5.72	471	4.35
115	6.48	219	5.72	515	4.24
129	6.48	224	5.39	555	4.02
137	6.37	239	5.18	615	3.91
146	6.26	246	5.23	620	3.74
147	6.10	290	5.18	659	3.63
159	6.05	306	5.13	739	3.46
165	5.94				



OFFSHORE OCEANOGRAPHY

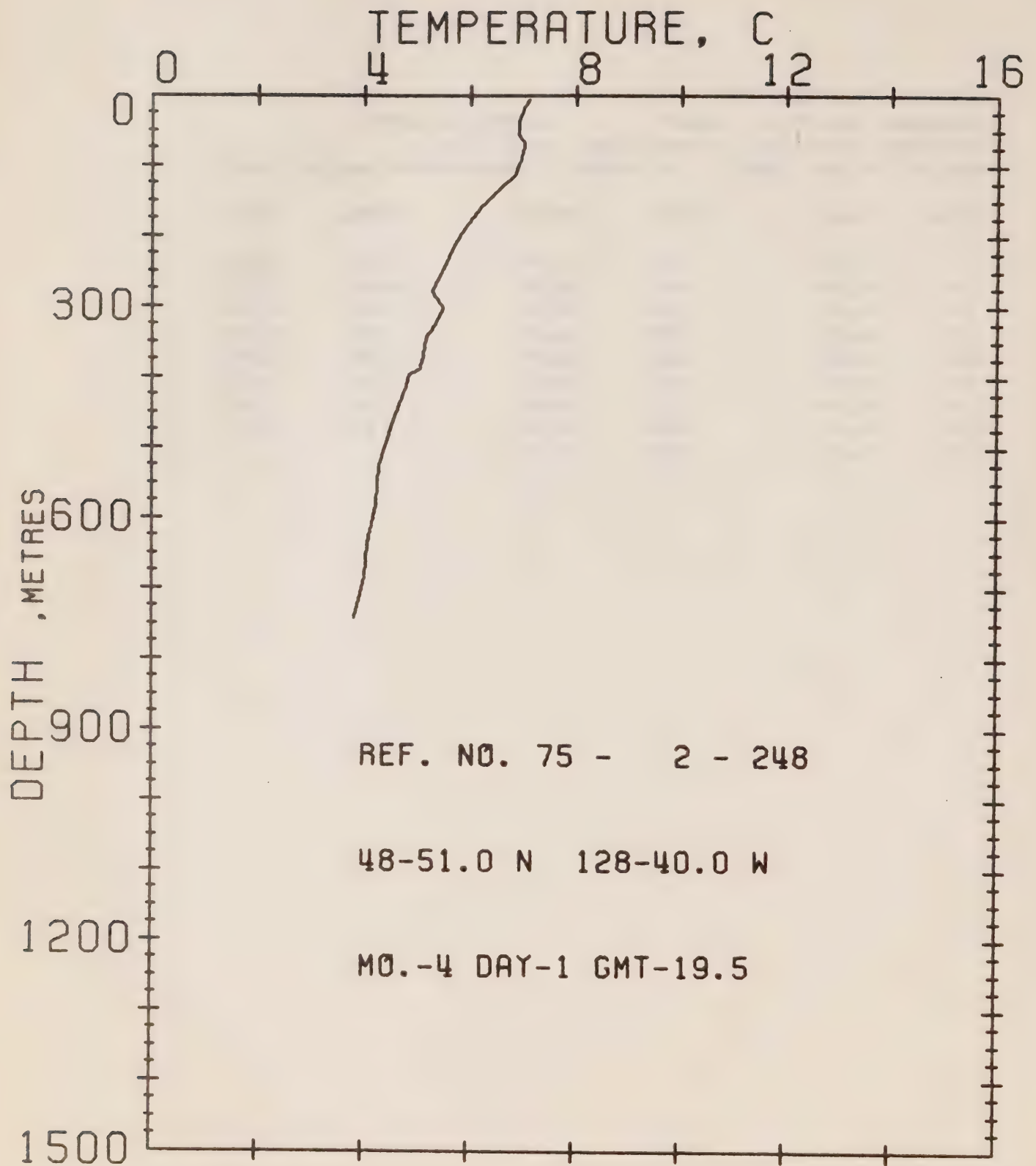
REFERENCE NO. 75- 2-247

DATE 01/ 4/75

POSITION 49-02.0N 130-40.0W GMT 13.3

RESULTS OF XBT CAST 26 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.07	186	6.75	396	4.90
8	6.96	206	6.59	443	4.74
37	6.96	225	6.42	472	4.57
67	6.91	255	6.15	529	4.52
100	6.85	286	5.83	582	4.30
123	6.85	298	5.67	627	4.18
138	6.96	314	5.45	670	4.02
167	6.91	334	5.39	744	3.91
183	6.85	375	5.18		



OFFSHORE OCEANOGRAPHY

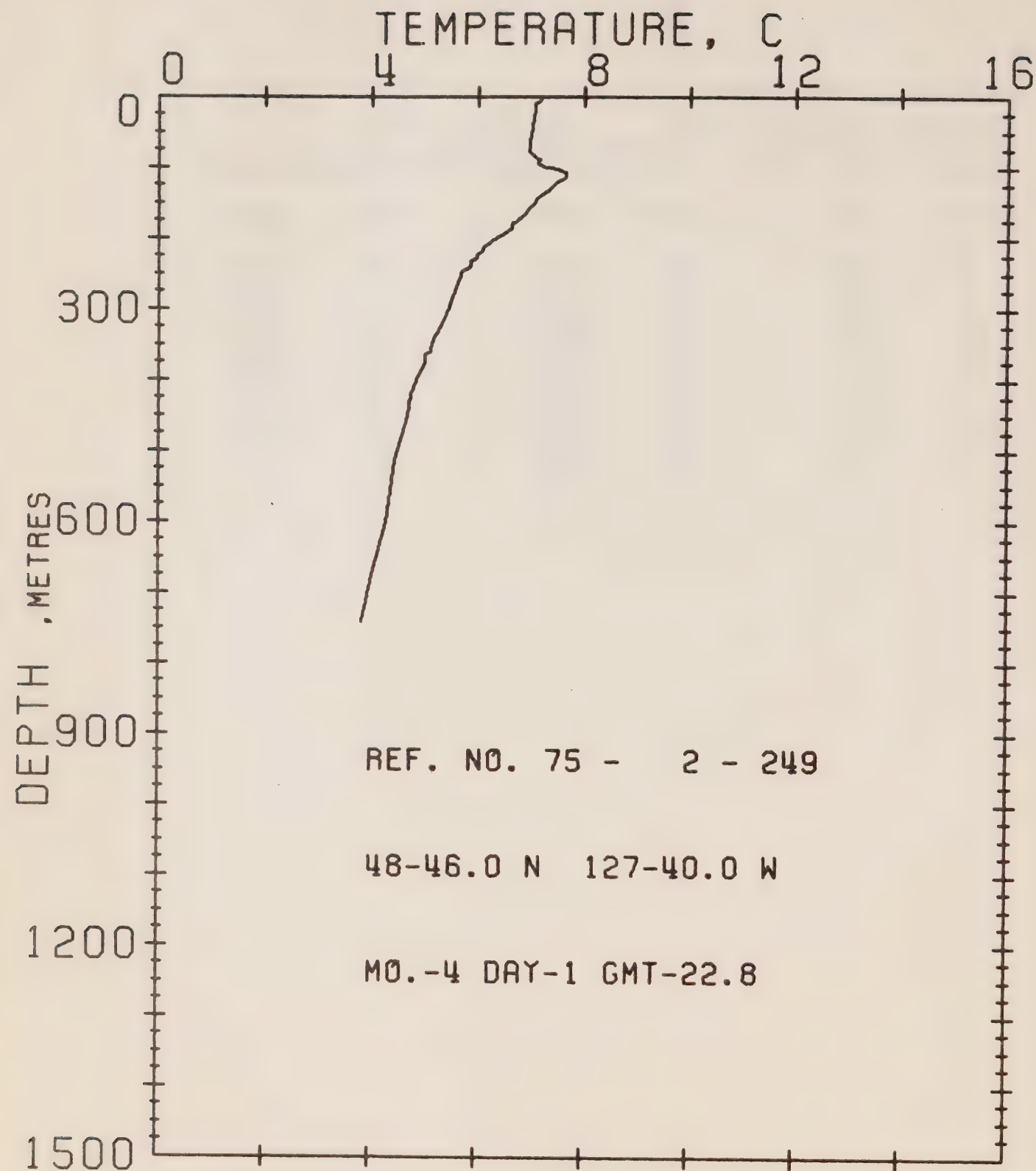
REFERENCE NO. 75- 2-248

DATE 01/ 4/75

POSITION 48-51.0N 128-40.0W GMT 19.5

RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	7.12	157	6.21	387	5.07
16	7.01	183	5.94	397	4.85
37	6.91	211	5.72	414	4.79
55	6.91	248	5.50	462	4.57
65	7.01	280	5.28	526	4.30
73	7.01	291	5.39	582	4.24
89	6.96	301	5.50	637	4.07
101	6.91	327	5.34	685	4.02
111	6.85	343	5.18	742	3.85
129	6.59	370	5.12		



OFFSHORE OCEANOGRAPHY

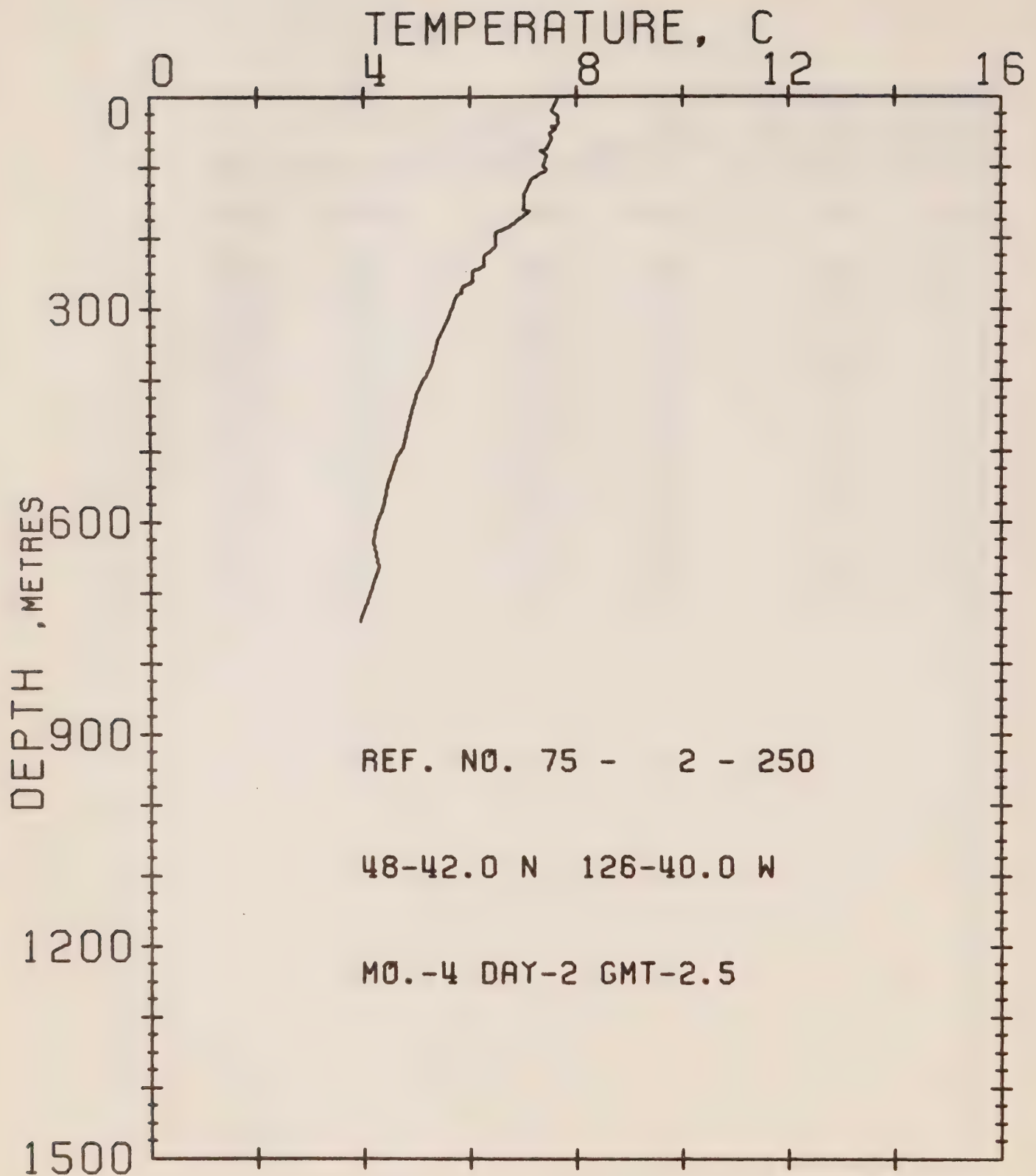
REFERENCE NO. 75- 2-249

DATE 01/ 4/75

POSITION 48-46.0N 127-40.0W GMT 22.8

RESULTS OF XBT CAST 46 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.18	140	7.18	315	5.39
9	7.07	154	7.01	329	5.28
20	7.07	168	6.85	335	5.23
44	7.01	179	6.64	343	5.18
64	6.96	186	6.64	358	5.12
78	6.96	203	6.26	360	5.12
84	7.07	209	6.15	365	5.01
90	7.18	224	5.99	378	5.01
94	7.12	231	5.94	392	4.90
99	7.28	233	5.88	422	4.74
101	7.39	241	5.88	452	4.68
103	7.55	246	5.72	513	4.46
106	7.65	255	5.67	601	4.30
114	7.65	271	5.61	675	4.02
119	7.50	292	5.50	742	3.85
132	7.34				



OFFSHORE OCEANOGRAPHY

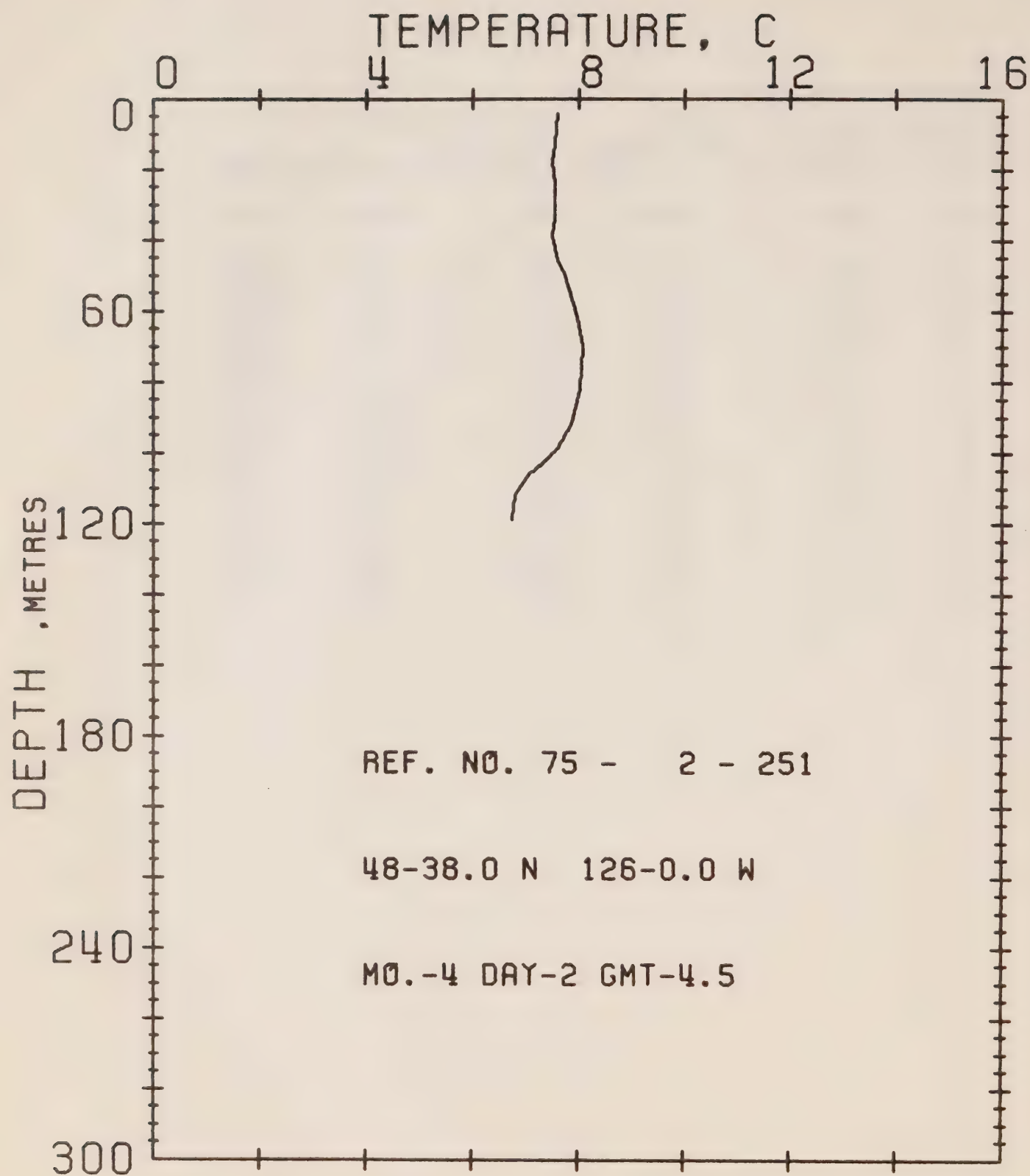
REFERENCE NO. 75- 2-250

DATE 02/ 4/75

POSITION 48-42.0N 126-40.0W GMT 02.5

RESULTS OF XBT CAST 47 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	7.65	109	7.34	280	5.77
13	7.60	116	7.18	313	5.61
19	7.55	138	7.01	346	5.39
28	7.65	151	7.01	379	5.28
37	7.65	160	7.01	415	5.01
43	7.55	163	7.12	460	4.85
46	7.60	168	7.01	496	4.74
49	7.55	184	6.75	505	4.63
53	7.50	192	6.48	548	4.46
60	7.55	212	6.48	571	4.41
73	7.44	225	6.26	606	4.24
76	7.34	241	6.26	627	4.18
84	7.44	247	6.05	663	4.30
95	7.39	261	6.05	699	4.13
101	7.39	267	5.88	740	3.96
105	7.44	278	5.83		



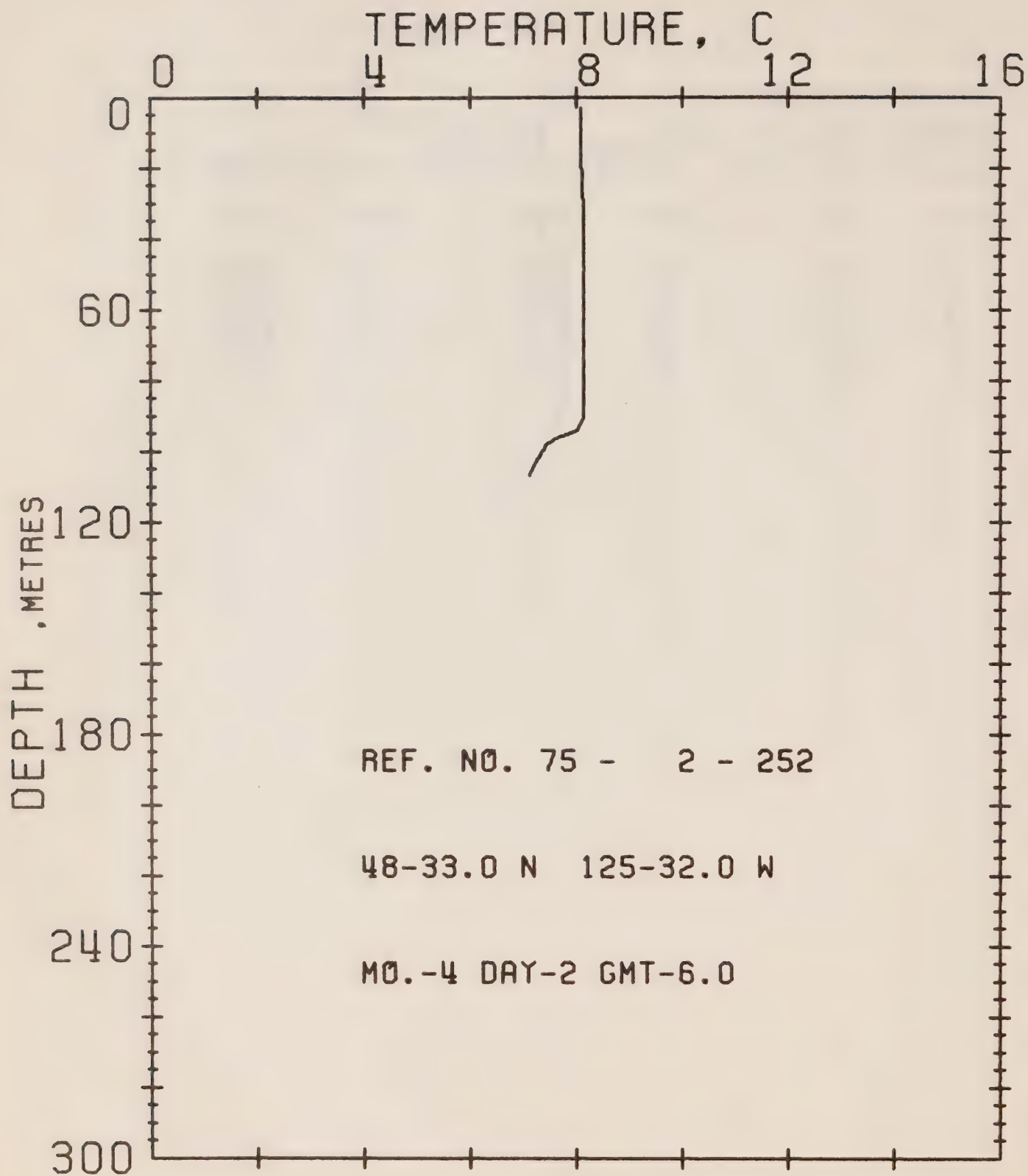
OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 2-251 DATE 02/ 4/75

POSITION 48-38.0N 126-00.0W GMT 04.5

RESULTS OF XBT CAST 17 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.60	46	7.60	99	7.60
13	7.55	49	7.71	103	7.34
18	7.50	62	7.97	106	7.07
24	7.55	70	8.08	112	6.80
34	7.55	82	8.03	119	6.75
39	7.50	92	7.87		



OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 2-252

DATE 02/ 4/75

POSITION 48-33.0N 125-32.0W GMT 06.0

RESULTS OF XBT CAST 12 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	8.08	70	8.13	96	7.65
16	8.08	84	8.13	98	7.44
33	8.13	91	8.13	102	7.28
45	8.13	94	8.03	107	7.12

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
(P-75-2)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 2

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
75	2	15	30	31.171	9.5	125-33
75	2	15	230	31.651	8.0	126- 0
75	2	15	430	31.784	7.9	126-40
75	2	15	745	32.427		127-40
75	2	15	1030	32.423		128-40
75	2	15	1630	32.580	7.4	130-40
75	2	15	2015		7.5	131-40
75	2	16	230	32.481		132-40
75	2	16	530		6.9	133-40
75	2	16	1015	32.395	6.6	134-40
75	2	16	1400		6.5	135-40
75	2	16	1700	32.562	6.5	136-40
75	2	16	2015		6.2	137-40
75	2	16	2330	32.620		138-40
75	2	17	300		5.9	139-40
75	2	17	545	32.622	5.9	140-40
75	2	17	1315	32.673	5.6	142-40
75	2	17	1930		5.2	143-40
75	2	18	0	32.706	4.8	ON STATION
75	2	19	0	32.687	5.0	ON STATION
75	2	20	0	32.692	5.4	ON STATION
75	2	21	0	32.692	5.4	ON STATION
75	2	22	0	32.689	5.5	ON STATION
75	2	23	0	32.677	5.1	ON STATION
75	2	24	0	32.685	5.4	ON STATION
75	2	25	0	32.701	5.5	ON STATION
75	2	26	0	32.679	5.5	ON STATION
75	2	27	0		5.4	ON STATION
75	2	28	0	32.686	5.5	ON STATION
75	3	1	0	32.682	5.5	ON STATION
75	3	2	0	32.686	5.4	ON STATION
75	3	3	0		5.5	ON STATION
75	3	4	0	32.686	5.5	ON STATION
75	3	5	0	32.682	5.4	ON STATION
75	3	6	0	32.687	5.4	ON STATION
75	3	7	0	32.689	5.4	ON STATION
75	3	8	0	32.689	5.3	ON STATION
75	3	9	0	32.691	5.5	ON STATION
75	3	10	0	32.674	5.3	ON STATION
75	3	11	0	32.682	5.6	ON STATION
75	3	12	0	32.684	5.6	ON STATION
75	3	13	0		5.2	ON STATION
75	3	14	0	32.679	5.3	ON STATION
75	3	15	0	32.680	5.1	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 2

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
75	3	16	0	32.687	5.1	ON STATION
75	3	17	0	32.674	5.3	ON STATION
75	3	18	0	32.679	5.1	ON STATION
75	3	19	0	32.678	5.0	ON STATION
75	3	20	0	32.698	5.1	ON STATION
75	3	21	0	32.704	4.9	ON STATION
75	3	22	0	32.808	4.2	ON STATION
75	3	23	0	32.724	4.9	ON STATION
75	3	24	0	32.734	4.6	ON STATION
75	3	25	0	32.735	4.6	ON STATION
75	3	26	0	32.720	5.0	ON STATION
75	3	27	0	32.720	5.0	ON STATION
75	3	28	0	32.709	5.0	ON STATION
75	3	29	0	32.711	5.0	ON STATION
75	3	30	0	32.710	5.0	ON STATION
75	3	30	1500	32.723	5.3	143-40
75	3	31	30	32.684	5.6	142-40
75	3	31	620		5.5	140-40
75	3	31	1145		5.5	138-40
75	3	31	1715		6.1	136-40
75	4	1	0		6.3	134-40
75	4	1	700	32.535	6.3	132-40
75	4	1	1315	32.603	6.9	130-40
75	4	1	1930	32.398	6.9	128-40
75	4	1	2245	32.455	7.5	127-40
75	4	2	230	31.911	7.5	126-40
75	4	2	430	31.423	7.5	126- 0
75	4	2	600	31.358	8.0	125-33



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**OCEANOGRAPHIC OBSERVATIONS
AT OCEAN STATION P
(50° N, 145° W)**

**VOLUME 66
28 March - 14 May 1975**



by

T.A. Smyth, G.W. Arminini, C. de Jong

**INSTITUTE OF OCEAN SCIENCES, PATRICIA BAY
Victoria, B.C.**



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28 March - 14 May 1975

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Institute of Ocean Sciences, Patricia Bay
Victoria, B.C.

January, 1976

This is a manuscript which has received only limited circulation. On citing this report in a bibliography, the title should be followed by the words "UNPUBLISHED MANUSCRIPT" which is in accordance with accepted bibliographic custom.

ABSTRACT

Physical, chemical and biological oceanographic observations are made from the weathership at Ocean Weather Station Papa, and between Esquimalt and Station Papa, on a routine continuing basis. Physical oceanography data only are shown, including profiles obtained with bottle casts, conductivity-temperature-pressure instruments, and mechanical and expendable bathythermographs. Surface observations are also shown.

INTRODUCTION

Canadian operation of Ocean Weather Station P (Latitude 50°00'N, Longitude 145°00'W) was inaugurated in December, 1950. The station is occupied primarily to make meteorological observations of the surface and upper air and to provide an air-sea rescue service. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the *CCGS VANCOUVER* and the *CCGS QUADRA*. Each ship remains on station for a period of six weeks, and is then relieved by the alternate ship, thus maintaining a continuous watch.

Bathythermograph observations have been made at Station P since July, 1952. A program of more extensive oceanographic observations commenced in August, 1956. This was extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections, in addition to being made on Line P oceanographic stations, are also made at odd meridians at 40', i.e., 139°40'W, 141°40'W, etc. These stations are known as Line P BT stations. Data observed prior to 1968 has been indexed by Collins *et al*, (1969).

The present record includes hydrographic and bathythermograph data collected from the *CCGS VANCOUVER* during the period 28 March to 14 May, 1975.

All physical oceanographic data have been stored by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), the Biological Station, Nanaimo, British Columbia, Canada. Requests for these data should be directed to FRB.

Marine geochemical data are for the Ocean Chemistry Group, Ocean and Aquatic Sciences, Department of the Environment, 512-1230 Government Street, Victoria, British Columbia, Canada.

PROGRAM OF OBSERVATIONS FROM CCGS VANCOUVER, 28 March - 14 May, 1975
(P-75-3) (CODC Ref. No. 15-75-003)

Oceanographic observations were made by Mr. T.A. Smyth and Mr. G.W. Arminini of Chemex Labs Ltd., North Vancouver, B.C.

En route to Station P, only Line P station 6 was occupied and a bottle cast made to 1500 metres for salinity and temperature.

Salinity, nitrate, alkalinity and total CO₂ samples were taken from the seawaterloop at stations 1-6. All other stations were missed due to poor weather conditions. The thermosalinograph was shut down at station 7 for the same reason. The surface temperature recorder was run continuously.

Mechanical BT or XBT's were taken at all Line P and BT stations.

At station P the oceanographic program was carried out as follows:

I. Physical Oceanography

- 1) Profiles of salinity, temperature and oxygen were obtained from 6 hydrographic stations to near bottom (4200 metres) and 1 to 600 metres.
- 2) Profiles of salinity and temperature were obtained from 2 hydrographic stations to 600 metres and 1 to 400 metres.
- 3) BT's were taken every three hours to coincide with meteorological observations, encoded and transmitted according to the IGOSS format.
- 4) Salinity samples daily at 0000 hrs GMT from the seawater loop.

II. Marine Geochemistry

- 1) Samples for nutrients, tritium, alkalinity and total CO₂ were obtained from 6 depths to 500 metres. Nutrient, phosphate and salinity samples were also collected daily at 0000 hrs GMT and once every hour for a 24 hour period from the seawater loop.
- 2) Alkalinity and total CO₂ samples every 3 days from the seawater loop.
- 3) Air CO₂ samples weekly in duplicate.
- 4) 2 seawater C-14 samples were extracted from the seawaterloop.
- 5) 5 surface tarball tows were made at a speed of 4 knots. The duration of each tow was approximately 30 minutes.

III. Biological and Productivity

Samples were obtained as follows:

- 1) 32 - 150 metre vertical plankton hauls.
 2 - 1200 metre vertical plankton hauls
 10 - Surface plankton tows for 10 minutes at sundown.
 33 - Micro and nano organism samples filtered from
 the seawater loop.
- 2) Samples for plant pigment, nitrate and C_{14} productivity
 were obtained from 3 stations to 200 metres.
- 3) Approximately 200 salmon were caught.

En route from Station P surface salinities and temperatures were taken at all line P stations with a bucket.

Nitrate, nutrient, alkalinity and total CO_2 samples were taken at station 6, 5 and 4 from the seawater loop.

All other stations and/or observations were missed due to equipment failure. The thermosalinograph was run only when the seawaterloop was operational. The surface temperature recorder was run continuously.

Mechanical BT's or XBT's were taken at all Line P or BT stations.

IV. Observations for Other Agencies

- 1) Marine mammal observations were made by the ship's officers for Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C. Canada.
- 2) Bird observations were made by the ship's officers for Dr. M. Myres, University of Alberta, Calgary, Alberta, Canada, and Mr. J. Guiguet, Curator of Birds and Mammals, Provincial Museum, Dept. of Recreation and Conservation, Victoria, British Columbia, Canada.
- 3) A waverider buoy was launched and recovered a number of times. A total of 44 20-minute records was obtained for the Department of the Environment, Ocean and Aquatic Sciences, Wave Climatic Study, Ottawa, Ontario, Canada.
- 4) Air CO_2 samples weekly in duplicate for Scripps Institute of Oceanography, La Jolla, San Diego, California, U.S.A.

Data was processed for publication by Messrs. C. de Jong, B. Minkley and E. Luscombe.

OBSERVATIONAL PROCEDURES

Temperatures at depth were measured by deep-sea-reversing thermometers of Richter and Wiese and/or Yoshino Keiki Co. manufacture. Two protected thermometers were used on all Nansen bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be $\pm 0.02^{\circ}\text{C}$.

Surface water temperatures were measured from a bucket sample using a deck thermometer of $\pm 0.1^{\circ}\text{C}$ accuracy.

Salinity determinations were made aboard ship with either an Auto-lab Model 601 Mark III inductive salinometer or a Hytech Model 6220 lab salinometer. Accuracy using duplicate determinations is estimated to be ± 0.003 ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of ± 5 m for depths less than 1000 m, and $\pm 0.5\%$ of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Line P engine intake continuous temperatures were recorded by a Honeywell Elektronik 15 Recorder. The temperature probe is at a depth of approximately 3 metres below the sea surface and the instrument accuracy is believed to be $\pm 0.1^{\circ}\text{C}$.

Each ship is equipped with a Plessey Model 6600-T thermosalinograph which is used, on Line P, for continuous recording of surface temperatures and salinities from the ship's seawater loop. The temperature probe is mounted at the seawater loop intake (approximately 3 metres below the surface) and the salinity probe and recorder are situated in the dry lab. The accuracy of this instrument is believed to be $\pm 0.1^{\circ}\text{C}$ for temperature and ± 0.1 ppt for salinity.

COMPUTATIONS

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 565 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity, and dissolved oxygen vs \log_{10} depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Data values which we suspect but which we have included in this data record are indicated with a plus. These data have been removed from punch card and magnetic tape records.

Analog records from the salinity-temperature-pressure instrument have been machine digitized, then replotted using the Calcomp plotter.

Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (degrees Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in metres
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of 10^8 ergs/cm ²
OXY	is the concentration of dissolved oxygen expressed in millilitres per litre
B-V PERIOD	is the Brunt-Vaisala period in minutes

REFERENCES

- Carpenter, J.H., 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. *Limnol. and Oceanogr.*, 10: 141-143.
- Collins, C.A., R.L. Tripe, D.A. Healey and J. Joergensen, 1969. The time distribution of serial oceanographic data from the Ocean Station P programme. *Fish.Res.Bd. Can. Tech. Rept. No. 106.*
- Reiniger, R.F., and C.K. Ross, 1968. A method of interpolation with application to oceanographic data. *Deep-Sea Res.*, 15: 185-193.
- U.S.N. Hydrographic Office, 1955. *Instruction Manual for oceanographic observations*, Publ. No. 607.

LIST OF FIGURES

- Figure 1 Chart showing Line P station positions.
- Figure 2 - 3 Composite plot of temperature vs \log_{10} depth. P-75-3
- Figure 4 - 5 Composite plot of salinity vs \log_{10} depth. P-75-3
- Figure 6 - 7 Composite plot of oxygen vs \log_{10} depth. P-75-3

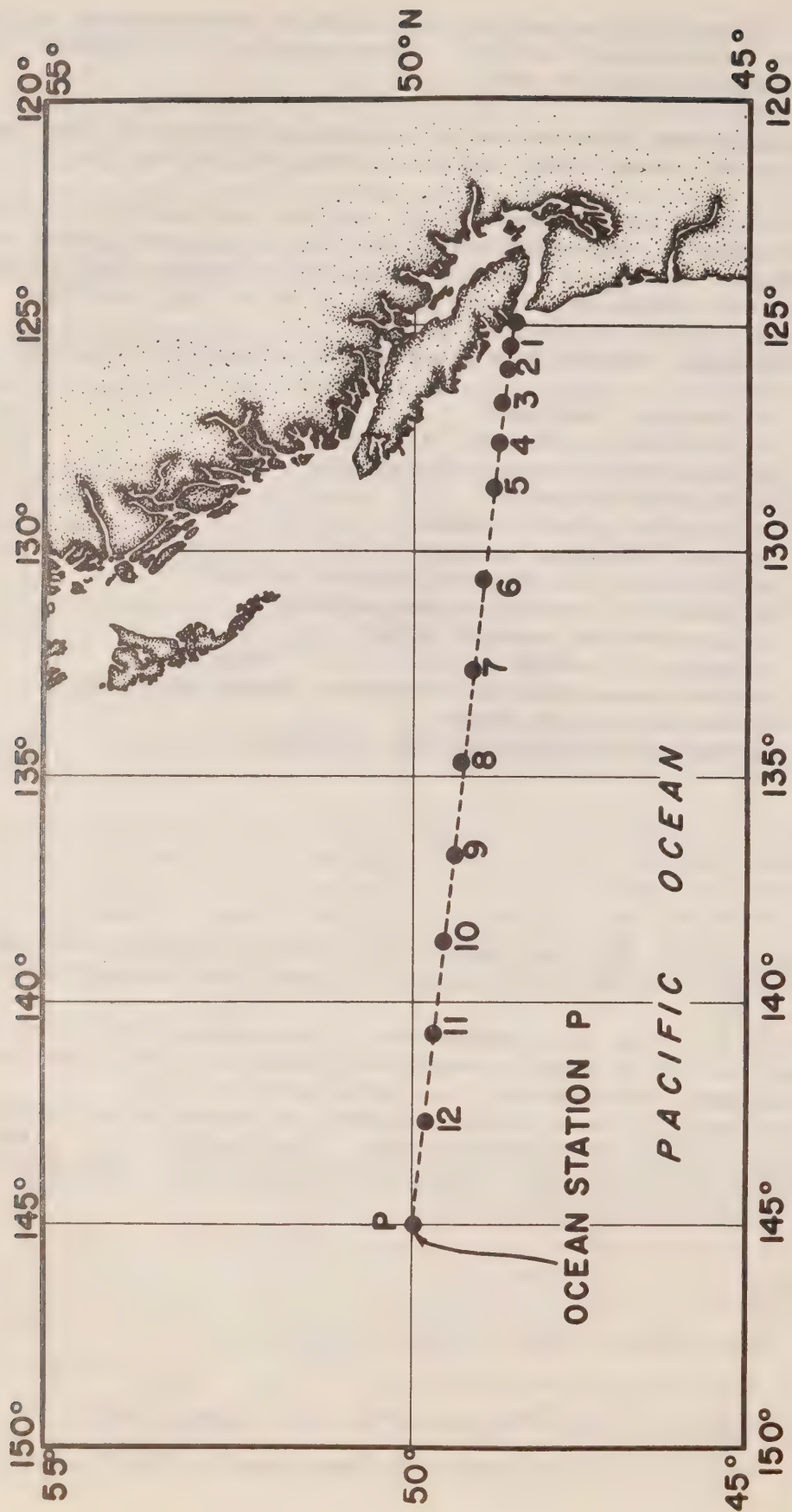


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-75-3

(CODC REFERENCE NO. 15-75-003)

RESULTS OF HYDROGRAPHIC OBSERVATIONS

(P-75-3)

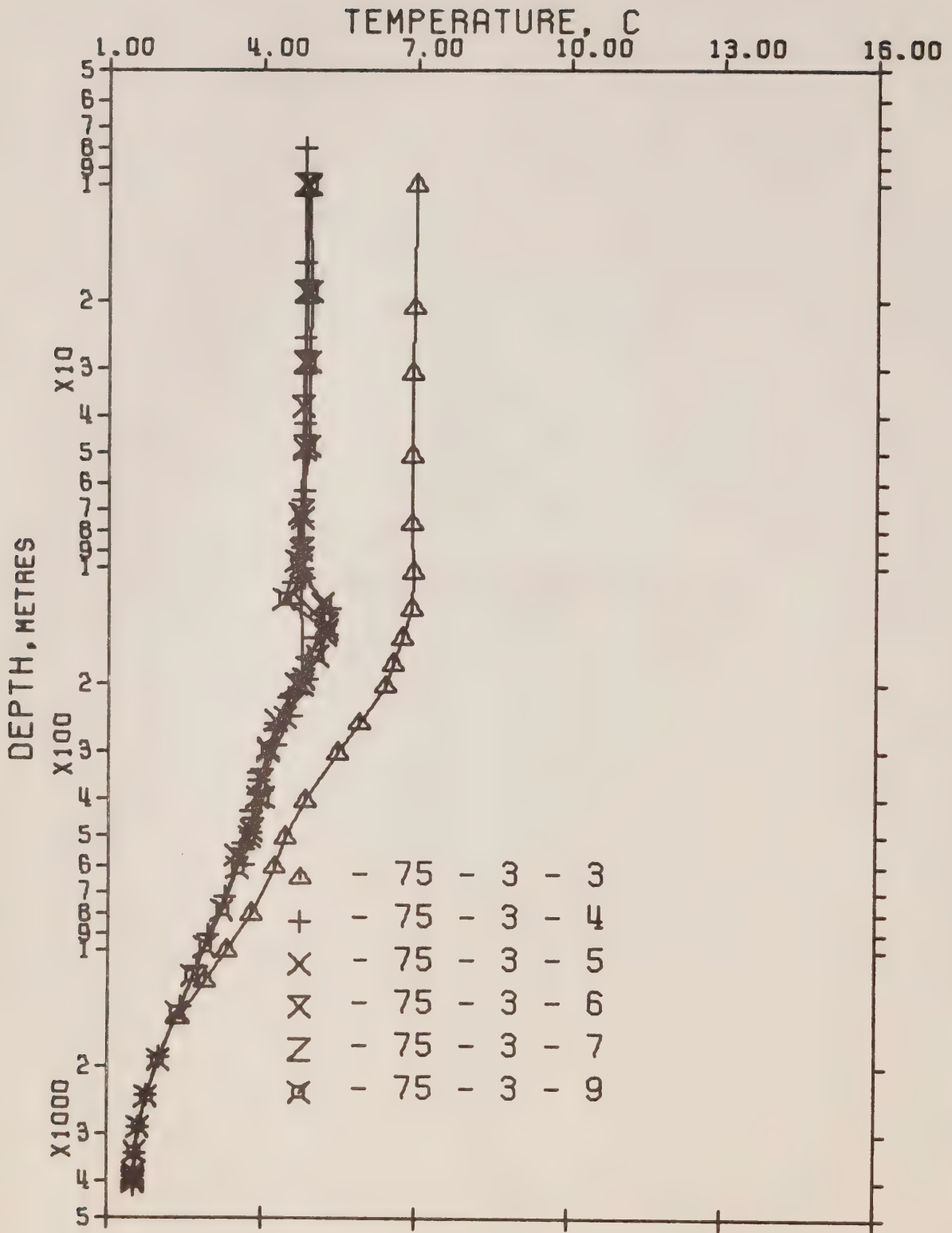


Figure 2 Composite plot of temperature vs log₁₀ depth. P-75-3

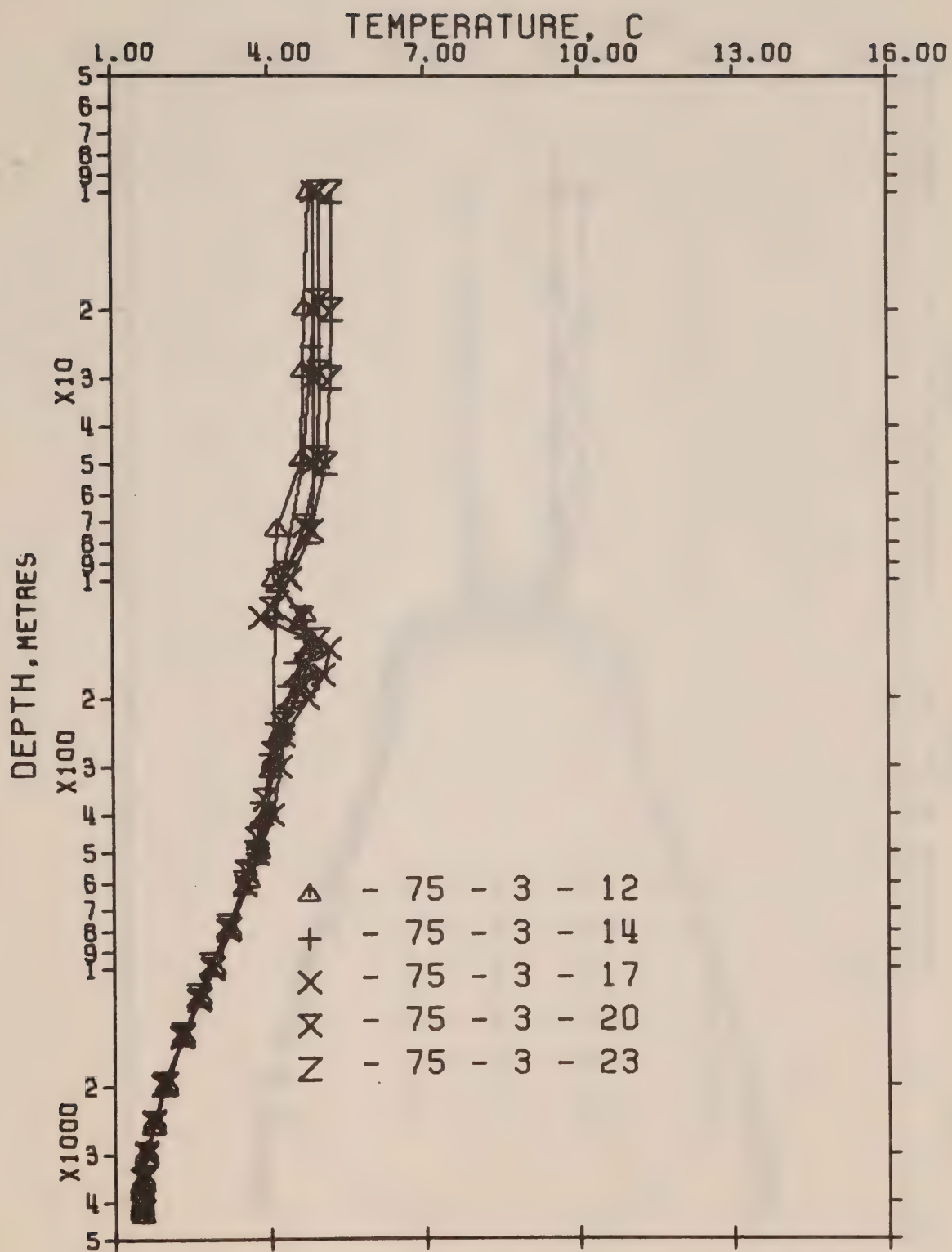


Figure 3. Composite plot of temperature vs \log_{10} depth. P-75-3

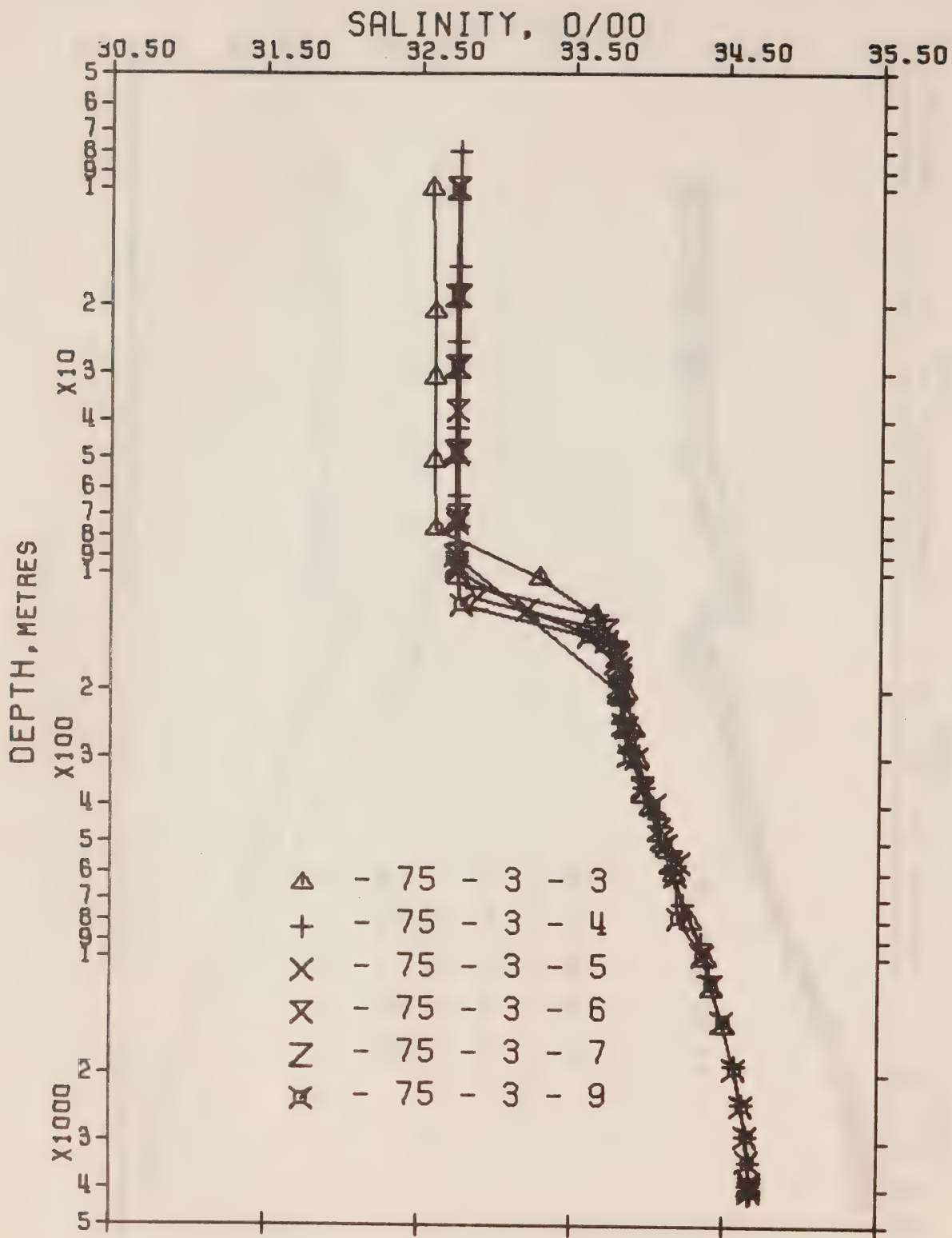


Figure 4. Composite plot of salinity vs \log_{10} depth. P-75-3

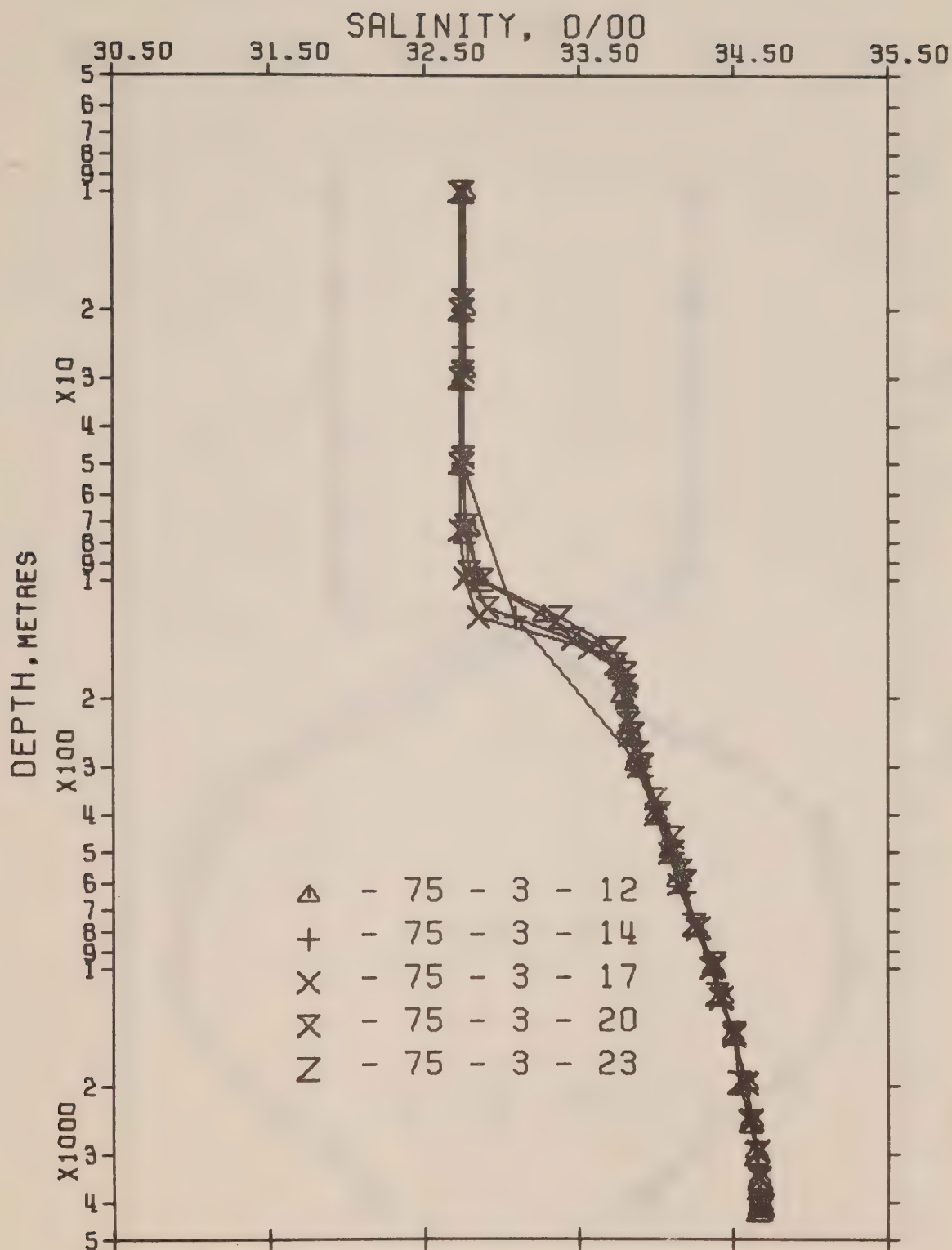


Figure 5. Composite plot of salinity vs \log_{10} depth. P-75-3

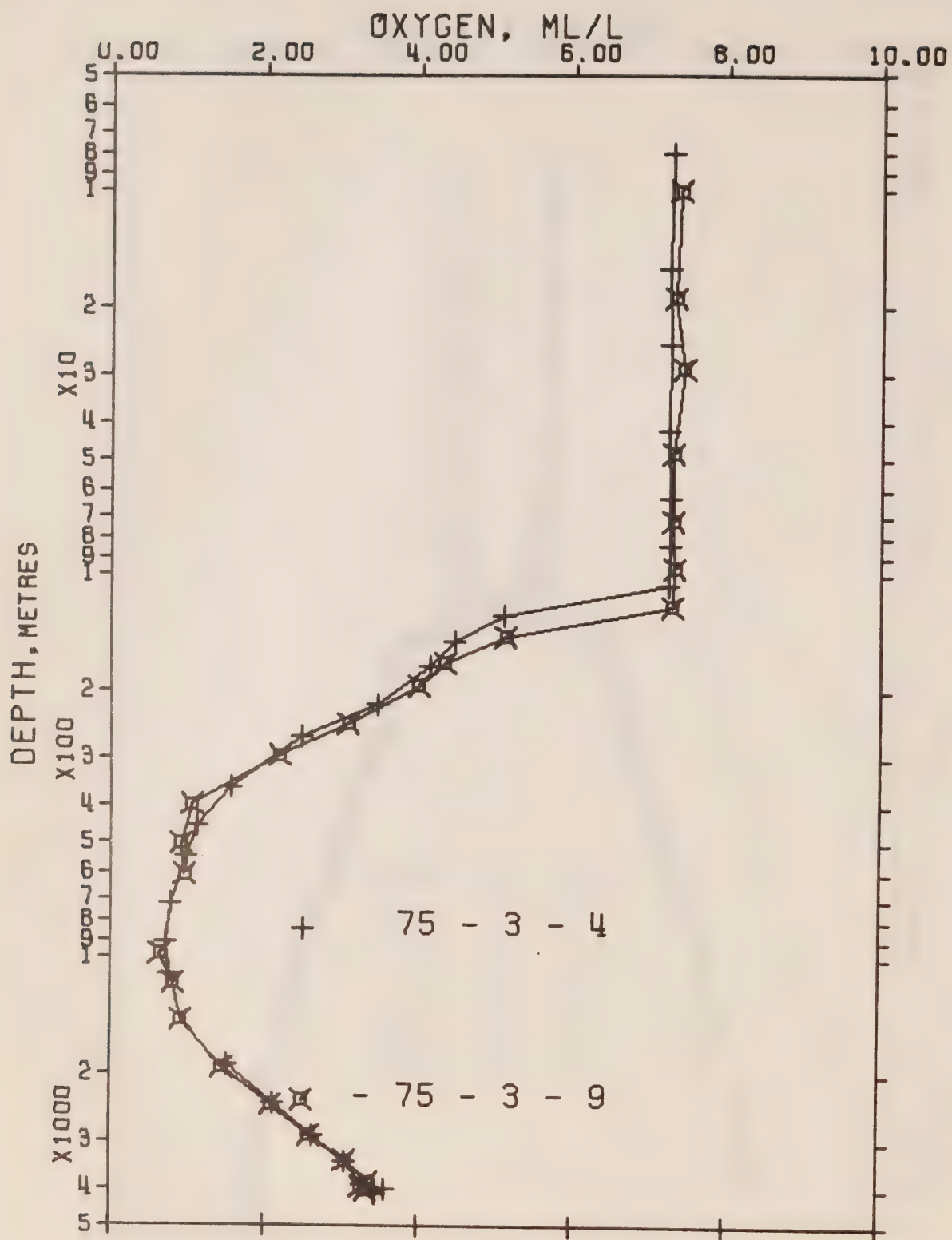


Figure 6. Composite plot of oxygen vs \log_{10} depth. P-75-3

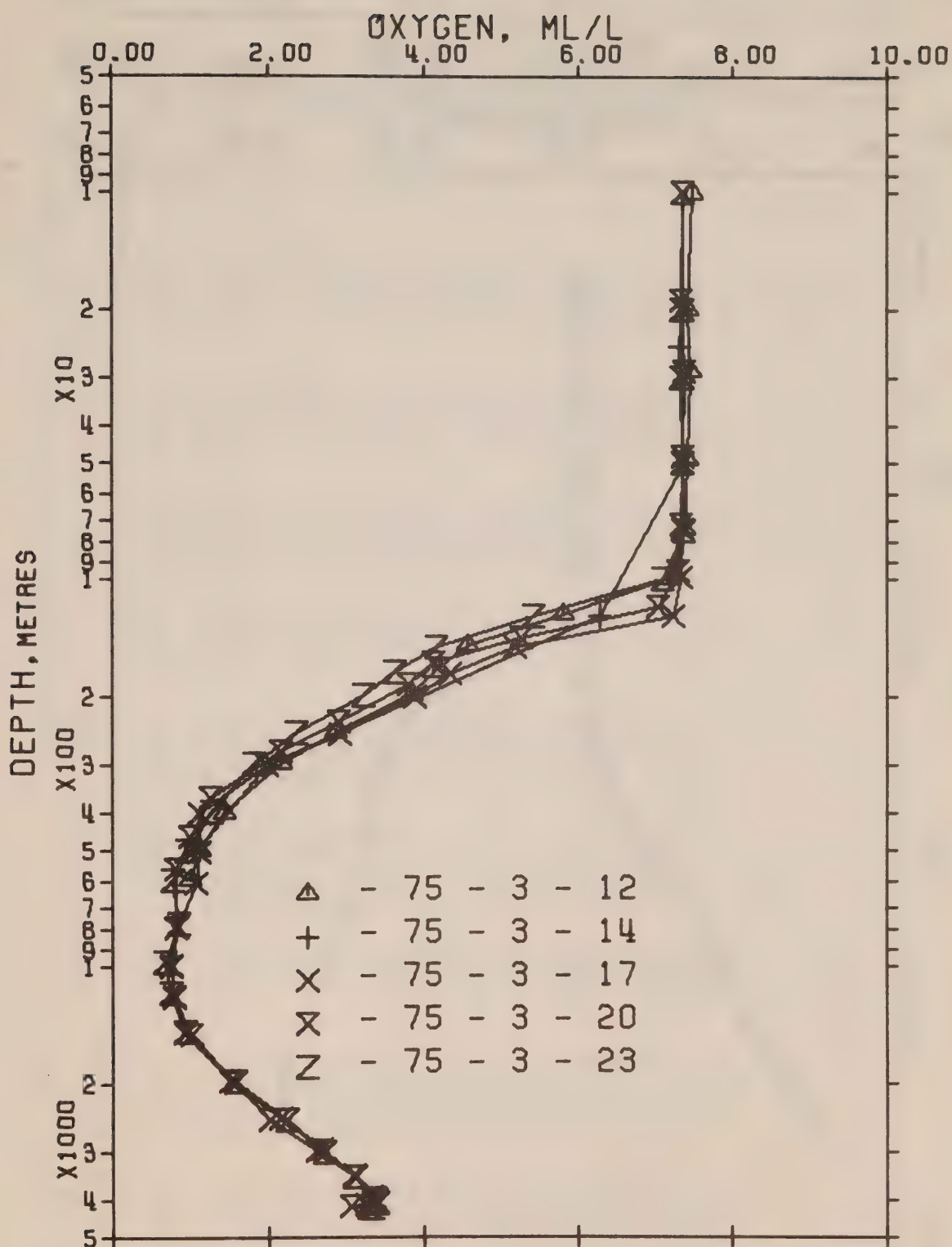
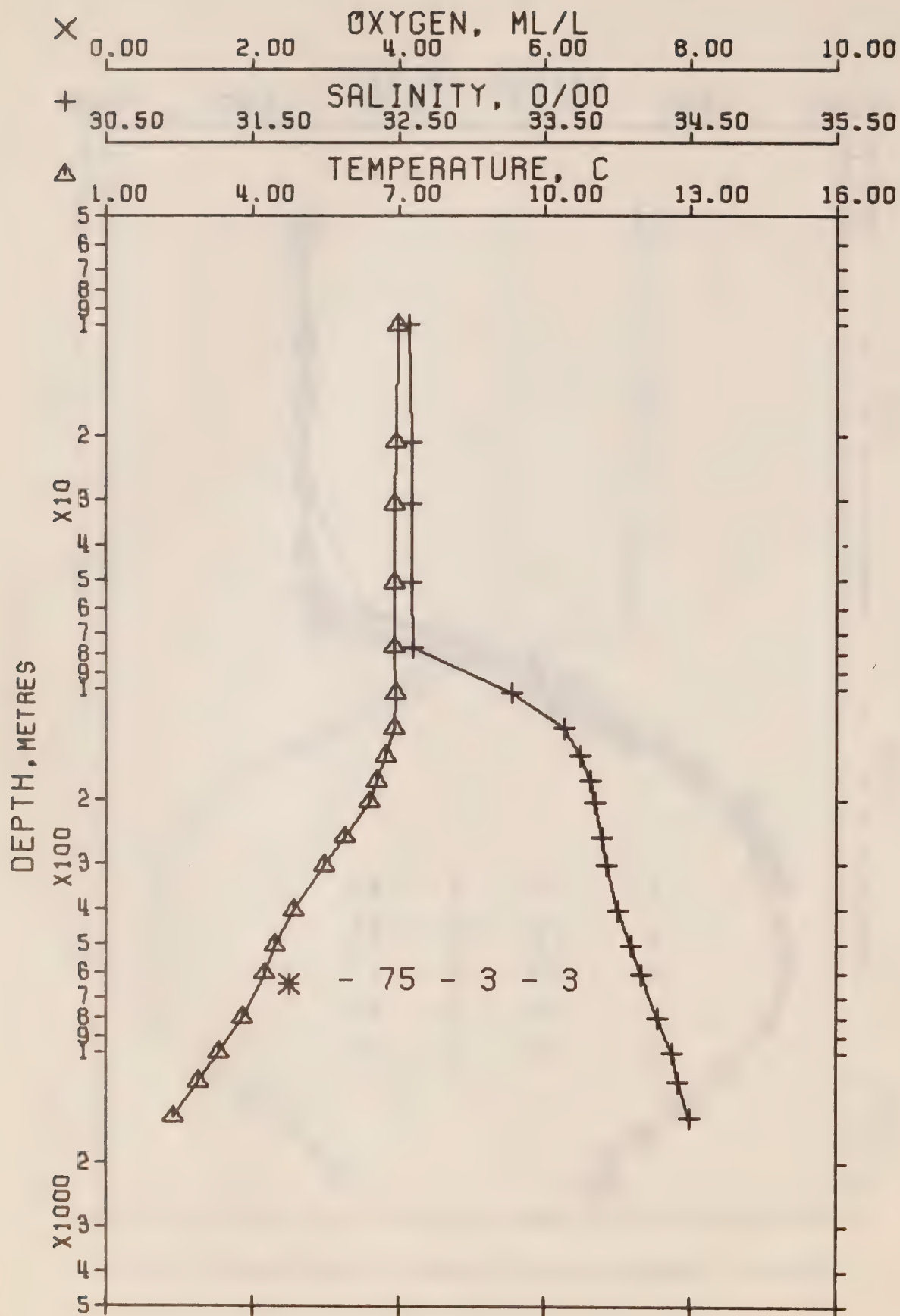


Figure 7. Composite plot of oxygen vs \log_{10} depth. P-75-3

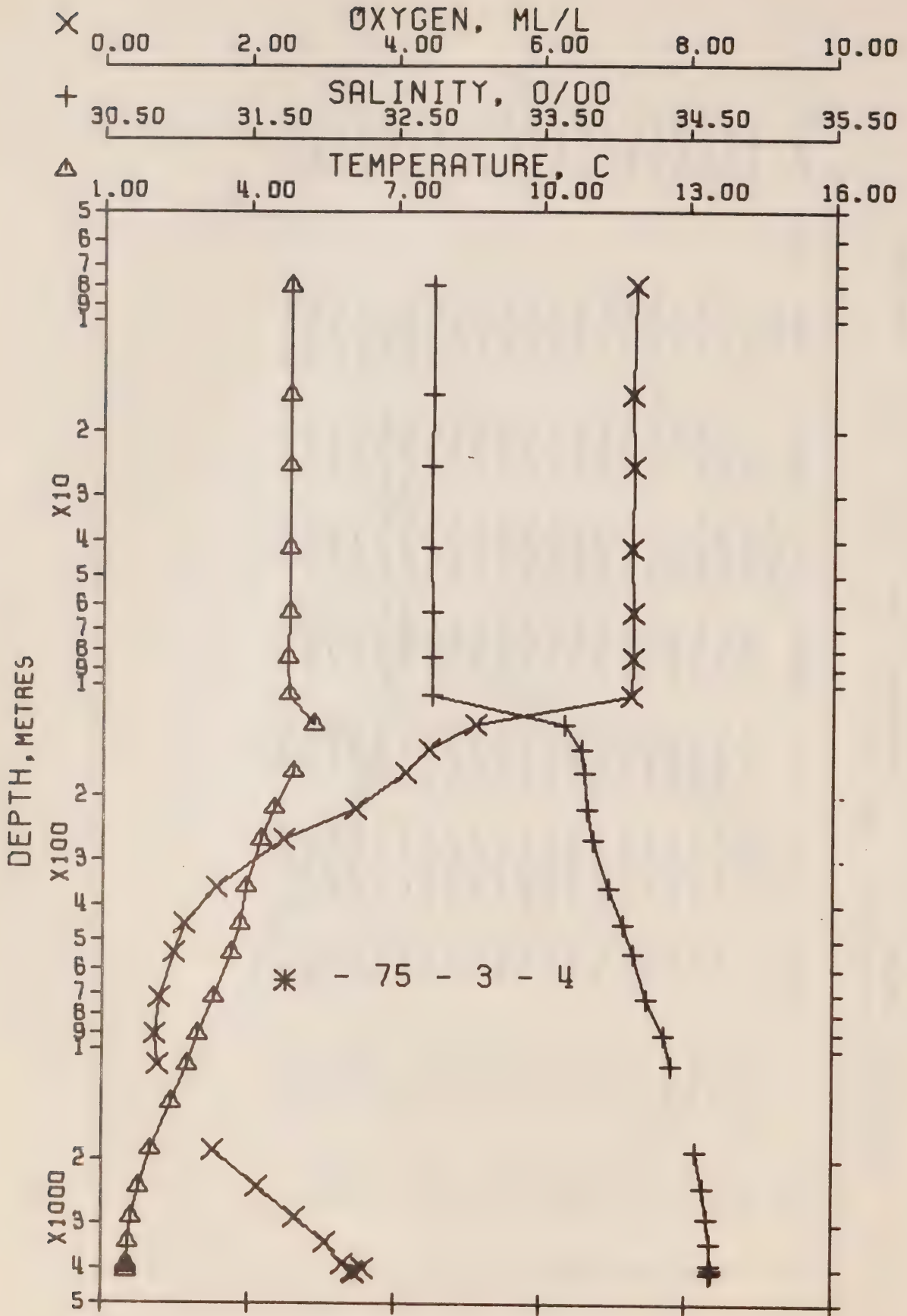


OFFSHORE OCEANOGRAPHY GROUP
 POSITION 49-20.0 N, 130-40.0 W GMT 18.2
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75-3-3

DATE 29/ 3/75

DRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.03	32.556	0	25.524	247.0	7.03	246.8	0.0	0.0		1476.
10	6.98	32.575	10	25.538	245.9	6.98	245.5	0.25	0.01		1475.
21	6.95	32.591	21	25.555	244.4	6.95	243.9	0.52	0.06		1476.
31	6.92	32.589	31	25.557	244.3	6.92	243.7	0.76	0.12		1476.
51	6.92	32.595	51	25.562	244.2	6.92	243.2	1.26	0.33		1476.
77	6.91	32.602	77	25.569	243.9	6.90	242.5	1.90	0.76		1477.
104	6.94	33.280	103	26.098	194.0	6.93	192.2	2.48	1.28		1478.
129	6.90	33.637	128	26.384	167.2	6.89	165.1	2.93	1.82		1473.
154	6.72	33.755	153	26.501	156.5	6.71	153.9	3.33	2.40		1479.
180	6.56	33.816	179	26.570	150.2	6.54	147.3	3.73	3.08		1479.
205	6.40	33.854	204	26.621	145.7	6.38	142.4	4.11	3.82		1479.
257	5.83	33.901	255	26.724	136.3	5.86	132.6	4.83	5.52		1477.
307	5.48	33.933	305	26.798	129.6	5.45	125.5	5.50	7.45		1477.
408	4.84	34.011	405	26.934	117.4	4.81	112.6	6.75	11.98		1476.
509	4.46	34.102	505	27.049	107.2	4.42	101.8	7.88	17.27		1476.
609	4.23	34.171	604	27.128	100.4	4.18	94.2	8.91	23.17		1477.
809	3.78	34.285	802	27.265	88.5	3.72	81.1	10.80	36.81		1478.
1011	3.30	34.379	1001	27.386	77.7	3.23	69.5	12.46	52.25		1480.
1213	2.90	34.420	1201	27.456	71.4	2.82	62.8	13.97	69.32		1481.
1523	2.39	34.501	1506	27.565	61.3	2.29	52.3	16.02	97.85		1484.

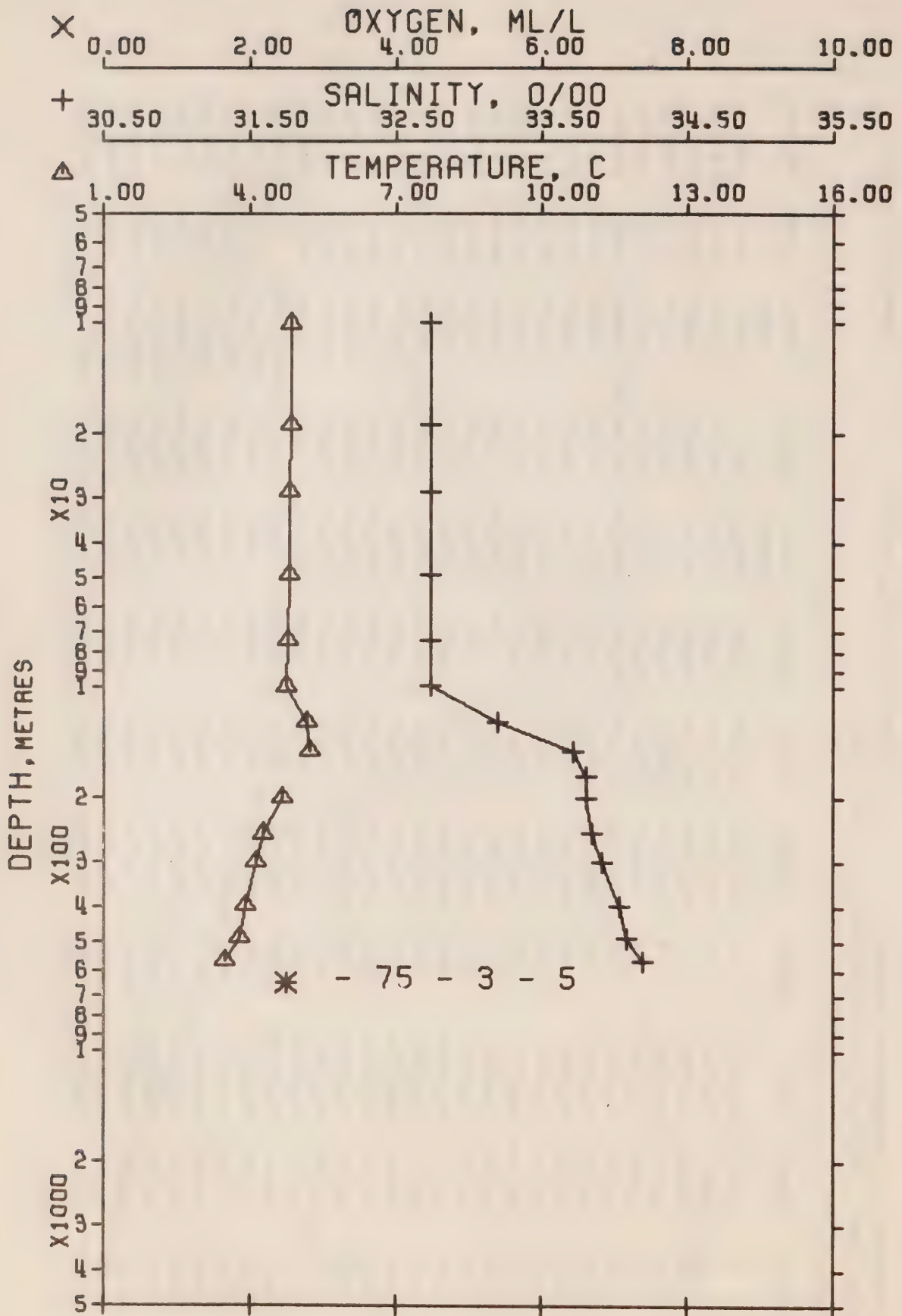


OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50-0.0 N. 145-0.0 W GMT 18.8
 HYDROGRAPHIC CAST DATA

DATE 3/ 4/75

REFERENCE NO. 75- 3- 4

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.81	32.746	0	25.936	207.9	4.81	207.6	0.0	0.0	7.25	1467.
8	4.80	32.747	8	25.938	207.8	4.80	207.5	0.17	0.01	7.27	1467.
16	4.82	32.749	16	25.938	207.9	4.82	207.6	0.33	0.03	7.23	1468.
25	4.80	32.743	25	25.935	208.3	4.80	207.7	0.52	0.07	7.25	1468.
42	4.80	32.745	42	25.937	208.2	4.80	207.6	0.88	0.19	7.25	1468.
63	4.81	32.753	63	25.942	207.9	4.81	207.1	1.32	0.43	7.26	1468.
85	4.79	32.746	84	25.939	208.4	4.78	207.4	1.76	0.76	7.25	1469.
107	4.80	32.751	106	25.941	208.3	4.79	207.1	2.23	1.22	7.24	1469.
129	5.31	33.657	128	26.600	146.3	5.30	144.5	2.62	1.69	5.10	1473.
151	5.24*	33.779	150	26.705	136.5	5.23	134.5	2.93	2.13	4.46	1473.
174	4.90	33.805	173	26.765	131.1	4.89	128.9	3.24	2.64	4.14	1472.
220	4.50	33.820	218	26.821	126.0	4.48	123.5	3.82	3.81	3.47	1471.
267	4.23	33.864	265	26.884	120.2	4.21	117.5	4.40	5.25	2.49	1471.
361	3.95	33.970	358	26.997	110.2	3.92	106.7	5.48	8.71	1.57	1471.
456	3.81	34.074	452	27.094	101.7	3.78	97.5	6.49	12.88	1.12	1472.
550	3.63	34.144	545	27.168	95.3	3.59	90.5	7.41	17.61	0.97	1473.
727	3.28	34.235	720	27.274	86.1	3.23	80.3	9.01	28.03	0.78	1475.
922	2.96	34.347	913	27.392	75.6	2.90	68.9	10.58	41.23	0.72	1477.
1119	2.73	34.403	1108	27.458	70.2	2.65	62.7	12.02	56.15	0.76	1479.
1418	2.40	34.476*	1403	27.544	62.7	2.30	54.4	14.00	81.79		1483.
1923	1.98	34.568	1900	27.652	53.3	1.85	44.0	16.90	131.14	1.52	1489.
2434	1.76	34.623	2402	27.713	48.5	1.59	38.0	19.48	188.49	2.13	1497.
2947	1.61	34.652	2905	27.747	46.0	1.39	34.4	21.89	254.71	2.65	1505.
3461	1.54	34.670	3407	27.767	45.3	1.27	32.3	24.23	330.89	3.06	1514.
3971	1.51	34.673	3905	27.771	46.0	1.19	31.5	26.56	419.53	3.31	1522.
4072	1.51	34.683	4003	27.779	45.5	1.18	30.6	27.02	438.37	3.58+	1524.
4163	1.52	34.681	4092	27.777	46.0	1.18	30.8	27.43	455.63	3.44	1526.
4173	1.52	34.671+	4102	27.769	46.8	1.18	31.6	27.48	457.65	3.47	1526.



DATE 4/ 4/75

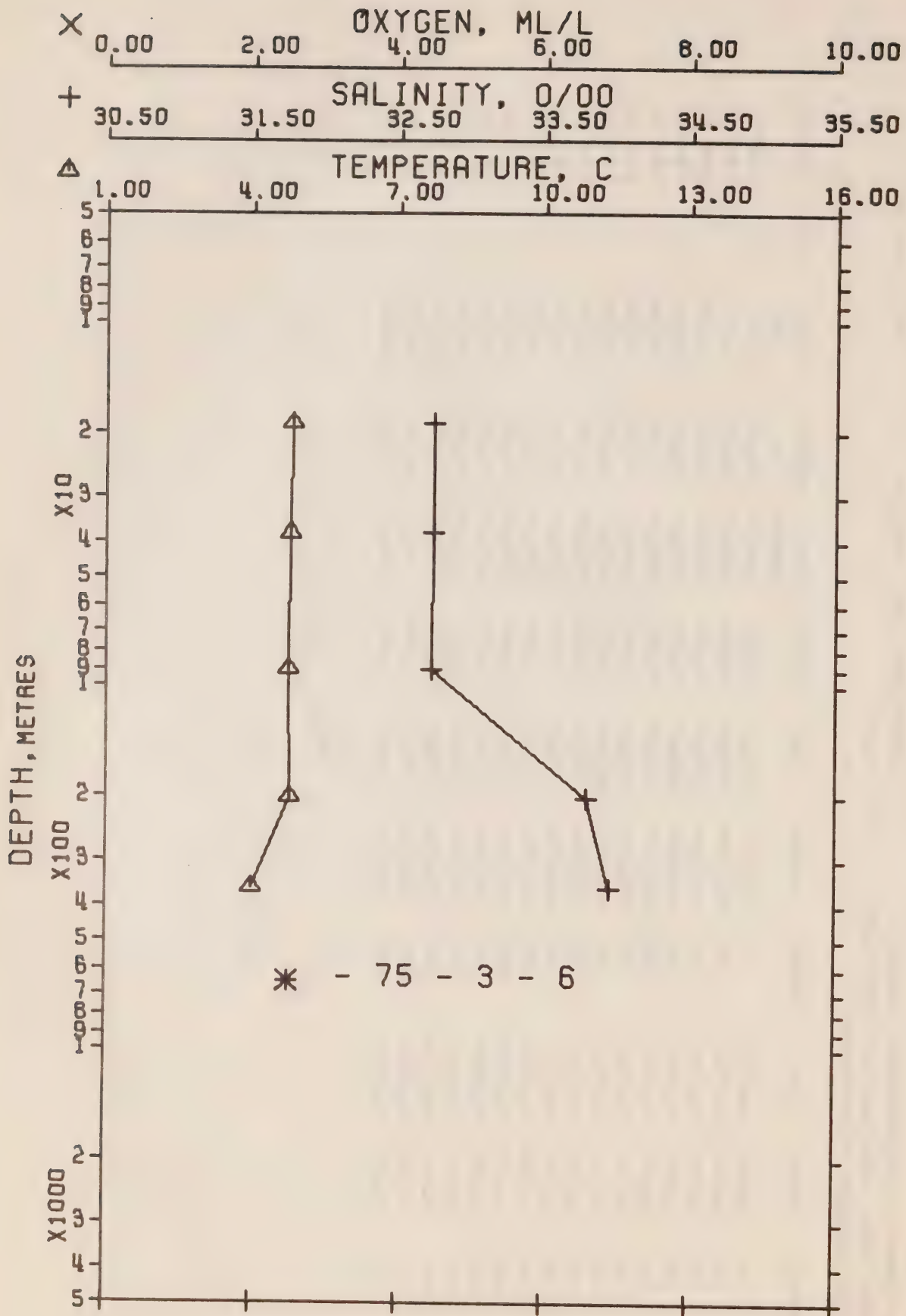
REFERENCE NO. 75- 3- 5

OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GMT 19.9

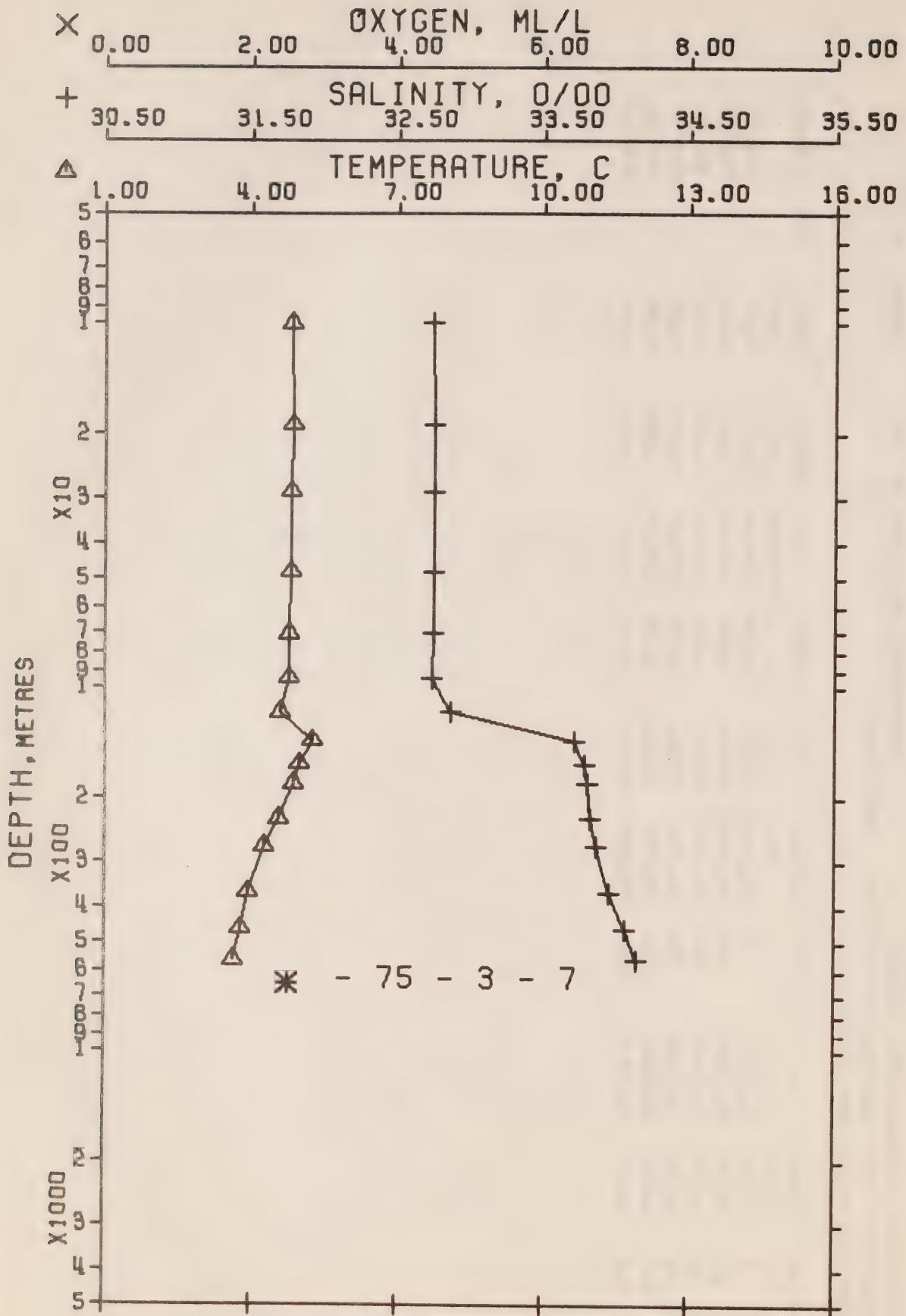
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.86	32.739	0	25.925	208.9	4.86	208.7	0.0	0.0		1467.
10	4.84	32.740	10	25.928	208.8	4.84	208.5	0.21	0.01		1468.
19	4.83	32.736	19	25.926	209.0	4.83	208.6	0.40	0.04		1469.
29	4.81	32.736	29	25.928	208.9	4.81	208.4	0.61	0.09		1468.
49	4.80	32.740	49	25.933	208.7	4.80	208.0	1.03	0.26		1468.
74	4.78	32.736	74	25.932	209.0	4.77	208.0	1.56	0.59		1468.
100	4.76	32.741	99	25.938	208.6	4.75	207.5	2.09	1.06		1469.
125	5.16	33.204	124	26.260	178.4	5.15	176.8	2.58	1.63		1471.
150	5.22	33.717	149	26.658	141.0	5.21	139.0	2.98	2.18		1473.
176	4.98*	33.813	175	26.762	131.4	4.97	129.2	3.33	2.77		1472.
201	4.66	33.813	200	26.798	128.1	4.64	125.7	3.66	3.40		1471.
253	4.28	33.847	251	26.866	122.0	4.26	119.3	4.30	4.88		1471.
303	4.11	33.916	301	26.938	115.4	4.09	112.4	4.90	6.58		1471.
400	3.91	34.030	397	27.056	104.9	3.88	101.1	5.96	10.39		1472.
489	3.80	34.088	485	27.106	100.9	3.77	96.3	6.88	14.55		1473.
567	3.49	34.202	562	27.227	89.7	3.45	84.8	7.62	18.54		1473.



OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50- 0.0 N, 145- 0.0 W GMT 18.8
 HYDROGRAPHIC CAST DATA
 REFERENCE NO. 75- 3- 6 DATE 5/ 4/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.84	32.741	0	25.929	208.6	4.84	208.4	0.0	0.0		1467.
19	4.82	32.737	19	25.928	208.8	4.82	208.5	0.40	0.04		1468.
38	4.77	32.743	38	25.938	208.0	4.77	207.5	0.80	0.16		1468.
91	4.74	32.733	90	25.934	208.9	4.73	207.8	1.90	0.89		1468.
203	4.79	33.805	202	26.777	130.2	4.77	127.7	3.85	3.64		1472.
361	4.01	33.961	358	26.984	111.5	3.98	108.0	5.64	8.96		1471.



7/ 4/75

DATE

7

3-

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REFERENCE NO.

18.6

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OFFSHORE OCEANOGRAPHY GROUP

POSITION

18.6

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W

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145-

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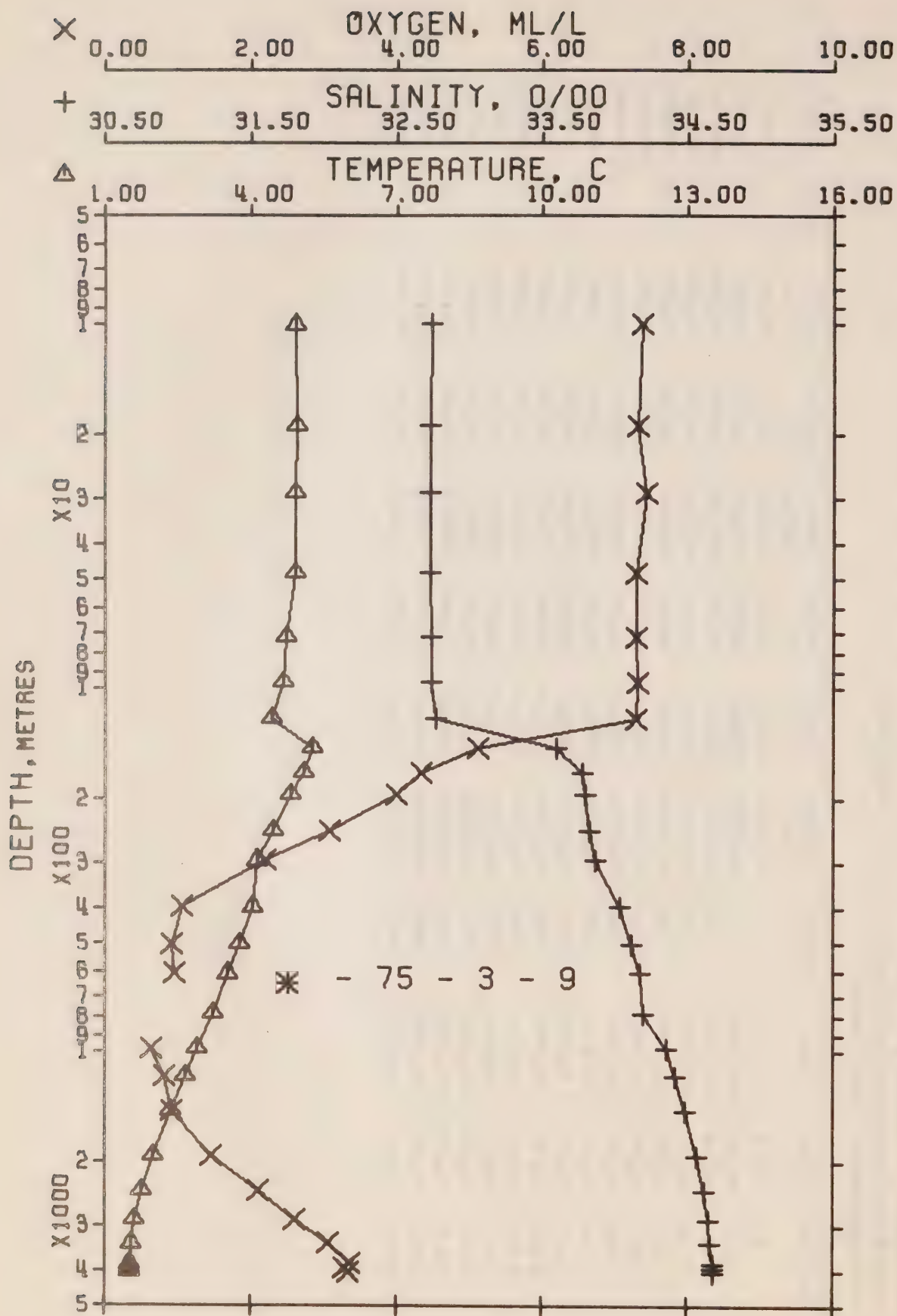
S.

OFFSHORE OCEANOGRAPHY GROUP

POSITION

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.83	32.747	0	25.935	208.0	4.83	207.8	0.0	0.0		1467.
10	4.82	32.743	10	25.933	208.3	4.82	208.0	0.21	0.01		1467.
19	4.84	32.746	19	25.933	208.4	4.84	207.9	0.40	0.04		1468.
29	4.91	32.749	29	25.939	207.9	4.81	207.4	0.61	0.09		1468.
48	4.80	32.748	48	25.939	208.0	4.80	207.4	1.01	0.25		1468.
71	4.79	32.746	71	25.939	208.3	4.78	207.4	1.49	0.54		1468.
95	4.77	32.743	94	25.938	208.5	4.76	207.4	1.97	0.95		1469.
118	4.61	32.874	117	26.059	197.2	4.60	195.9	2.45	1.47		1468.
141	5.25	33.716	140	26.654	141.3	5.24	139.4	2.84	1.98		1473.
163	4.90	33.794	162	26.746	132.8	4.98	130.7	3.14	2.45		1472.
195	4.88	33.814	184	26.774	130.3	4.87	128.0	3.43	2.96		1472.
231	4.58	33.934	229	26.823	125.9	4.56	123.4	4.01	4.19		1471.
275	4.28	33.868	273	26.882	120.5	4.26	117.7	4.56	5.60		1471.
367	3.95	33.963	364	26.992	110.8	3.92	107.3	5.62	9.07		1471.
463	3.80	34.068	459	27.090	102.1	3.77	97.9	6.64	13.38		1472.
566	3.63	34.150	561	27.172	95.0	3.59	90.0	7.65	18.69		1473.



DATE 10/ 4/75

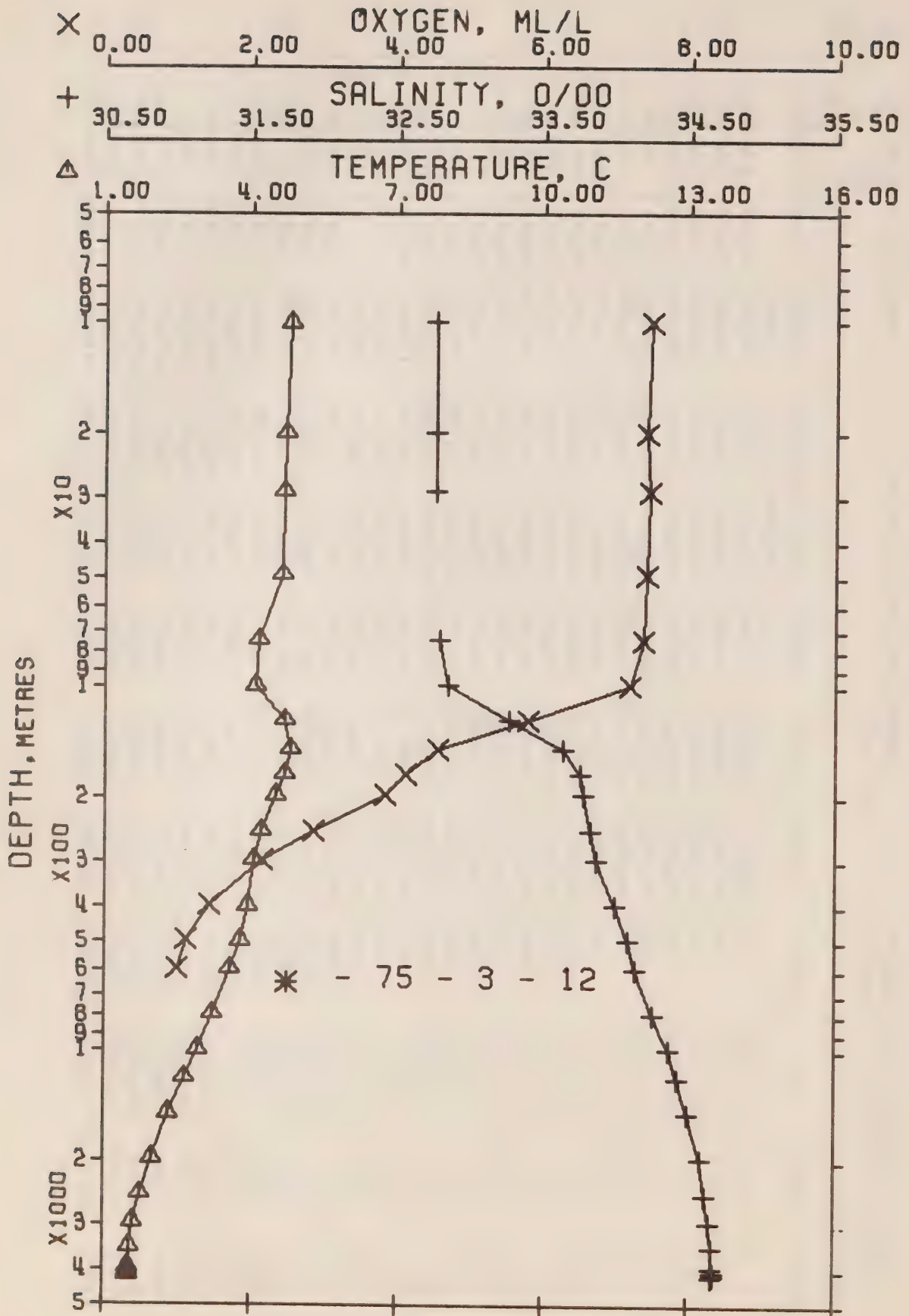
REFERENCE NO. 75- 3- 9

OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GMT 18.8

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.94	32.732	0	25.911	210.3	4.94	210.1	0.0	0.0	7.29	1463.
10	4.91	32.739	10	25.920	209.6	4.91	209.2	0.21	0.01	7.38	1468.
19	4.93	32.731	19	25.911	210.4	4.93	210.0	0.40	0.04	7.32	1468.
29	4.90	32.731	29	25.915	210.2	4.90	209.7	0.61	0.09	7.44	1468.
48	4.90	32.732	48	25.915	210.3	4.90	209.6	1.02	0.25	7.31	1468.
72	4.73	32.744	72	25.943	207.8	4.72	206.9	1.52	0.56	7.30	1468.
97	4.67	32.742	96	25.948	207.6	4.66	206.5	2.02	0.99	7.33	1468.
122	4.43	32.768	121	25.994	203.3	4.42	202.1	2.55	1.58	7.30	1468.
146	5.27	33.596	145	26.557	150.6	5.26	148.6	2.98	2.16	5.13	1473.
171	5.07	33.781	170	26.726	134.7	5.06	132.5	3.33	2.73	4.33	1472.
196	4.82	33.805	195	26.774	130.4	4.80	128.1	3.66	3.36	3.99	1472.
247	4.45	33.835	245	26.838	124.6	4.43	121.9	4.30	4.81	3.08	1471.
298	4.11	33.874	296	26.905	118.5	4.09	115.6	4.93	6.54	2.19	1471.
401	4.02	34.040	398	27.046	106.0	3.99	102.1	6.08	10.65	1.05	1472.
507	3.76	34.116	503	27.132	98.5	3.72	93.8	7.16	15.65	0.91	1473.
614	3.53	34.185	609	27.210	91.7	3.49	86.4	8.18	21.45	0.97	1474.
792	3.23	34.198	785	27.249	88.8	3.18	82.7	9.78	33.01		1475.
984	2.90	34.359	975	27.407	74.5	2.83	67.5	11.36	47.20	0.64	1477.
1178	2.65	34.418	1166	27.477	68.5	2.57	60.9	12.73	62.36	0.82	1480.
1468	2.35	34.495	1452	27.564	61.0	2.25	52.5	14.60	87.58	0.92	1483.
1956	1.99	34.575	1932	27.657	53.0	1.86	43.5	17.35	135.63	1.46	1490.
2444	1.76	34.623	2412	27.713	48.6	1.59	38.0	19.82	190.97	2.09	1497.
2933	1.61	34.651	2891	27.746	46.1	1.39	34.5	22.12	254.01	2.59	1505.
3422	1.54	34.663	3369	27.761	45.7	1.28	32.8	24.35	326.40	3.06	1513.
3908	1.52	34.678	3843	27.775	45.6	1.21	31.2	26.57	409.17	3.37	1521.
4004	1.52	34.681	3937	27.777	45.6	1.20	30.9	27.01	426.90	3.27+	1523.
4091	1.52	34.681*	4022	27.777	45.9	1.19	30.8	27.41	443.36		1524.
4100	1.52	34.681	4031	27.777	45.9	1.19	30.8	27.45	445.13	3.33+	1524.



DATE 14/ 4/75

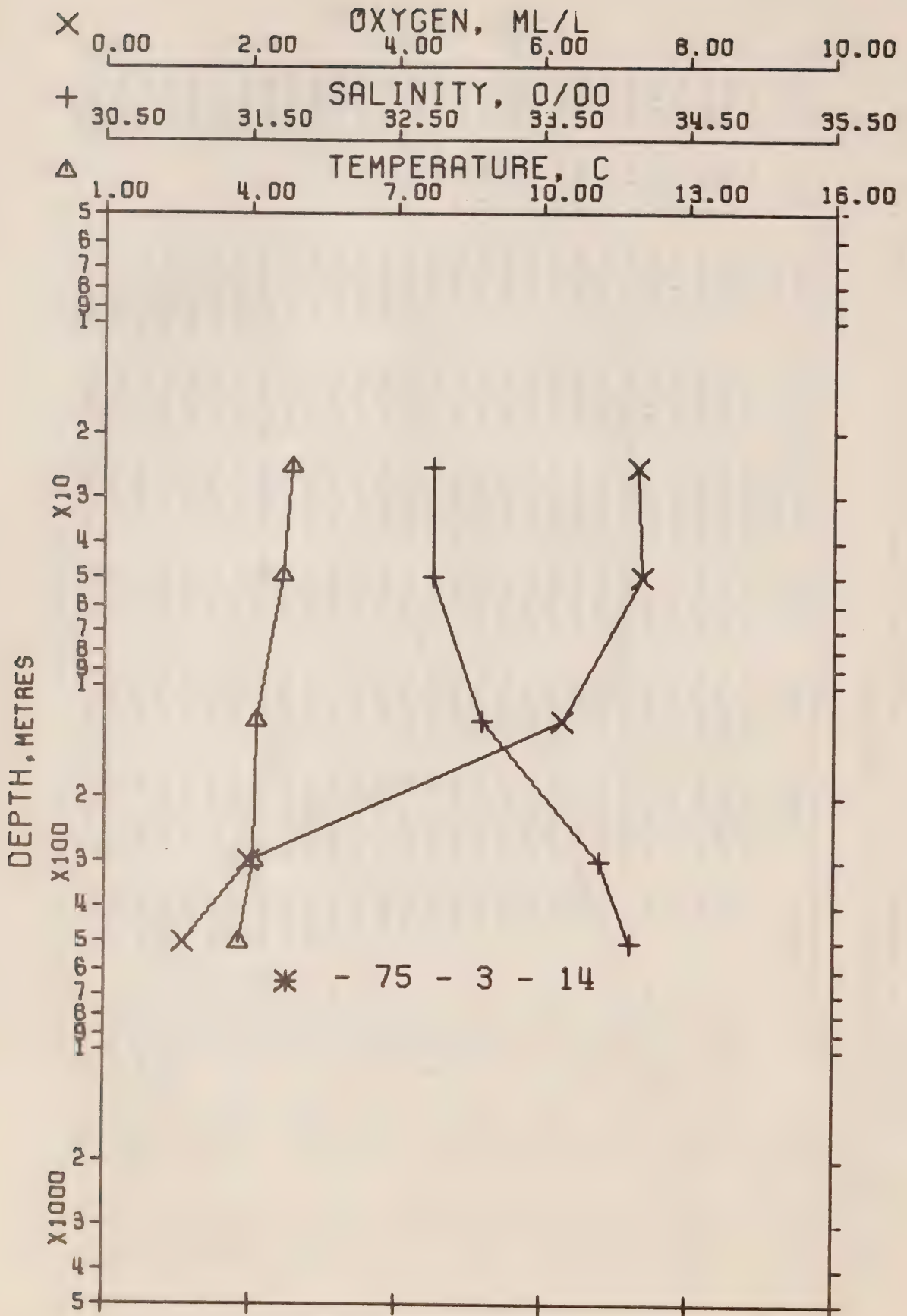
REFERENCE NO. 75- 3- 12

OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N. 145- 0.0 W GMT 18.4

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
9	4.82	32.761	0	25.947	206.9	4.82	206.6	0.0	0.0	7.39	1467.
10	4.79	32.760	10	25.950	206.7	4.79	206.4	0.21	0.01	7.47	1467.
20	4.68	32.762	20	25.963	205.5	4.68	205.1	0.42	0.04	7.41	1467.
29	4.65	32.764	29	25.968	205.1	4.65	204.7	0.60	0.09	7.46	1467.
49	4.63	32.768*	49	25.973	204.8	4.63	204.1	1.01	0.25	7.43	1467.
74	4.15	32.792	74	26.042	198.3	4.14	197.6	1.52	0.58	7.38	1466.
100	4.09	32.854	99	26.097	193.3	4.08	192.3	2.02	1.02	7.19	1465.
124	4.69	33.272	123	26.366	168.2	4.68	166.8	2.46	1.52	5.80	1469.
149	4.81	33.639	148	26.643	142.2	4.80	140.5	2.85	2.06	4.56	1471.
174	4.69	33.757	173	26.750	132.3	4.68	130.3	3.19	2.62	4.11	1471.
199	4.50	33.779	198	26.788	128.9	4.49	126.6	3.52	3.25	3.85	1471.
250	4.22	33.927	248	26.856	122.8	4.20	120.2	4.15	4.70	2.86	1470.
300	4.07	33.873	298	26.908	118.2	4.05	115.2	4.76	6.40	2.16	1471.
401	3.93	33.906	398	27.020	108.4	3.90	104.6	5.90	10.48	1.45	1472.
501	3.80	34.095	497	27.112	100.4	3.76	95.8	6.94	15.27	1.13	1473.
600	3.58	34.145	595	27.173	95.1	3.54	89.9	7.91	20.70	1.00	1474.
798	3.22	34.260	791	27.299	84.1	3.16	77.9	9.68	33.34		1476.
999	2.91	34.368	989	27.414	74.0	2.84	67.0	11.26	47.78		1478.
1199	2.65	34.427	1187	27.484	68.0	2.57	60.2	12.68	63.68		1480.
1500	2.33	34.500	1484	27.569	60.6	2.23	52.0	14.61	90.22		1484.
2004	1.98	34.586	1980	27.666	52.3	1.84	42.6	17.42	140.48		1491.
2509	1.75	34.625	2475	27.715	48.5	1.57	37.7	19.95	198.55		1498.
3013	1.61	34.651	2969	27.746	46.3	1.39	34.4	22.33	265.56		1506.
3516	1.53	34.671	3461	27.768	45.2	1.26	32.1	24.62	341.82		1514.
4019	1.51	34.675	3952	27.773	45.9	1.18	31.3	26.91	429.97		1523.
4120	1.51	34.681	4050	27.778	45.7	1.17	30.8	27.37	449.07		1525.
4210	1.52	34.678	4138	27.775	46.4	1.17	31.0	27.78	466.53		1526.
4220	1.52	34.670	4147	27.768	46.9	1.17	31.6	27.83	468.38		1527.

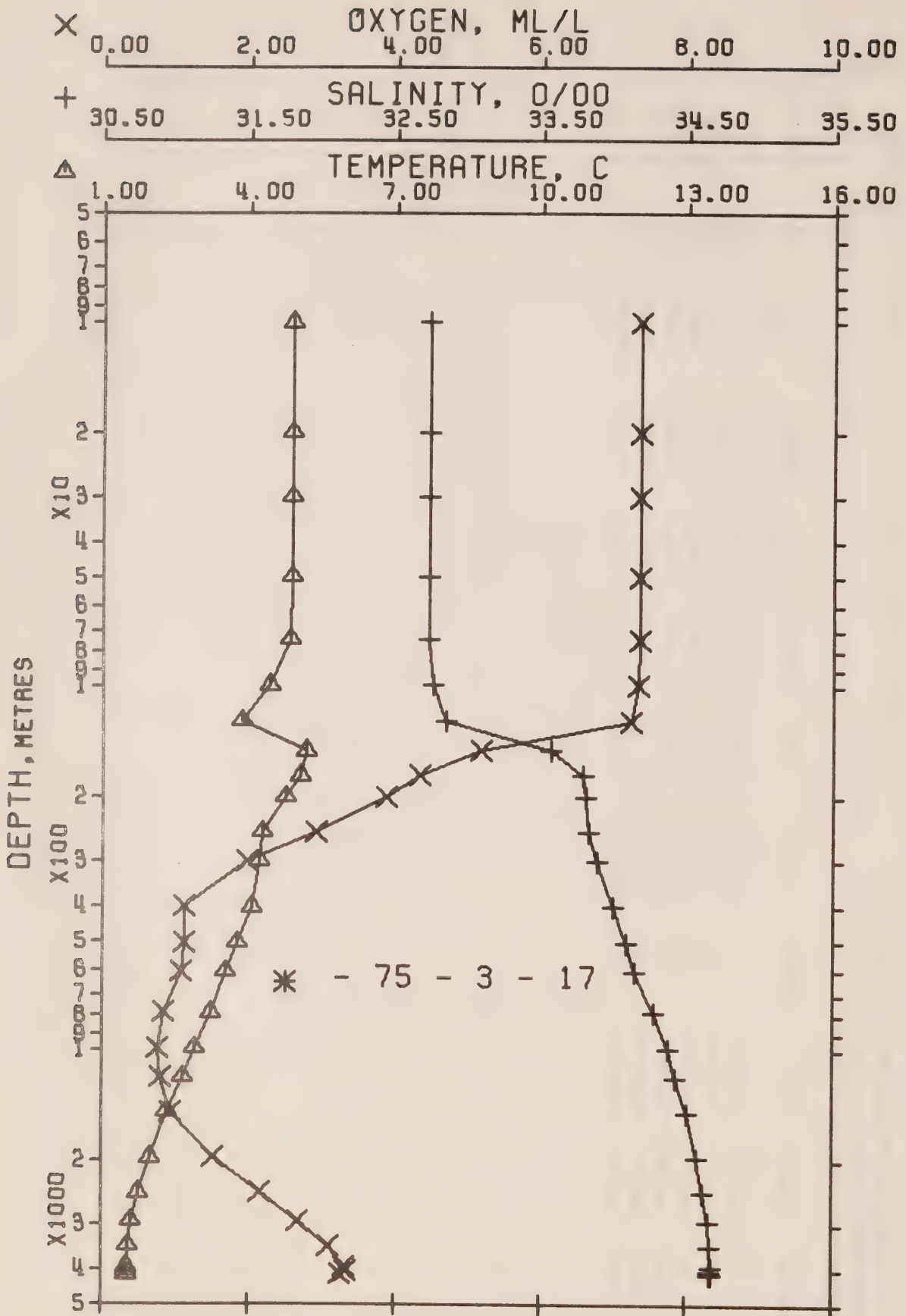


OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50- 0.0 N, 145- 0.0 W GMT 17.8
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75- 3- 14

DATE 15/ 4/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.96	32.745	0	25.919	209.5	4.96	209.3	0.0	0.0	7.41	1468.
25	4.83	32.746	25	25.934	208.3	4.83	207.8	0.53	0.07	7.32	1468.
50	4.66	32.749	50	25.954	206.7	4.66	205.9	1.05	0.27	7.39	1467.
126	4.12	33.387	125	26.279	176.3	4.11	175.0	2.51	1.57	6.28	1467.
304	4.07	33.904	302	26.933	116.0	4.05	112.9	5.05	7.03	1.98	1471.
509	3.75	34.110	505	27.129	98.8	3.71	94.2	7.18	15.97	1.08	1473.

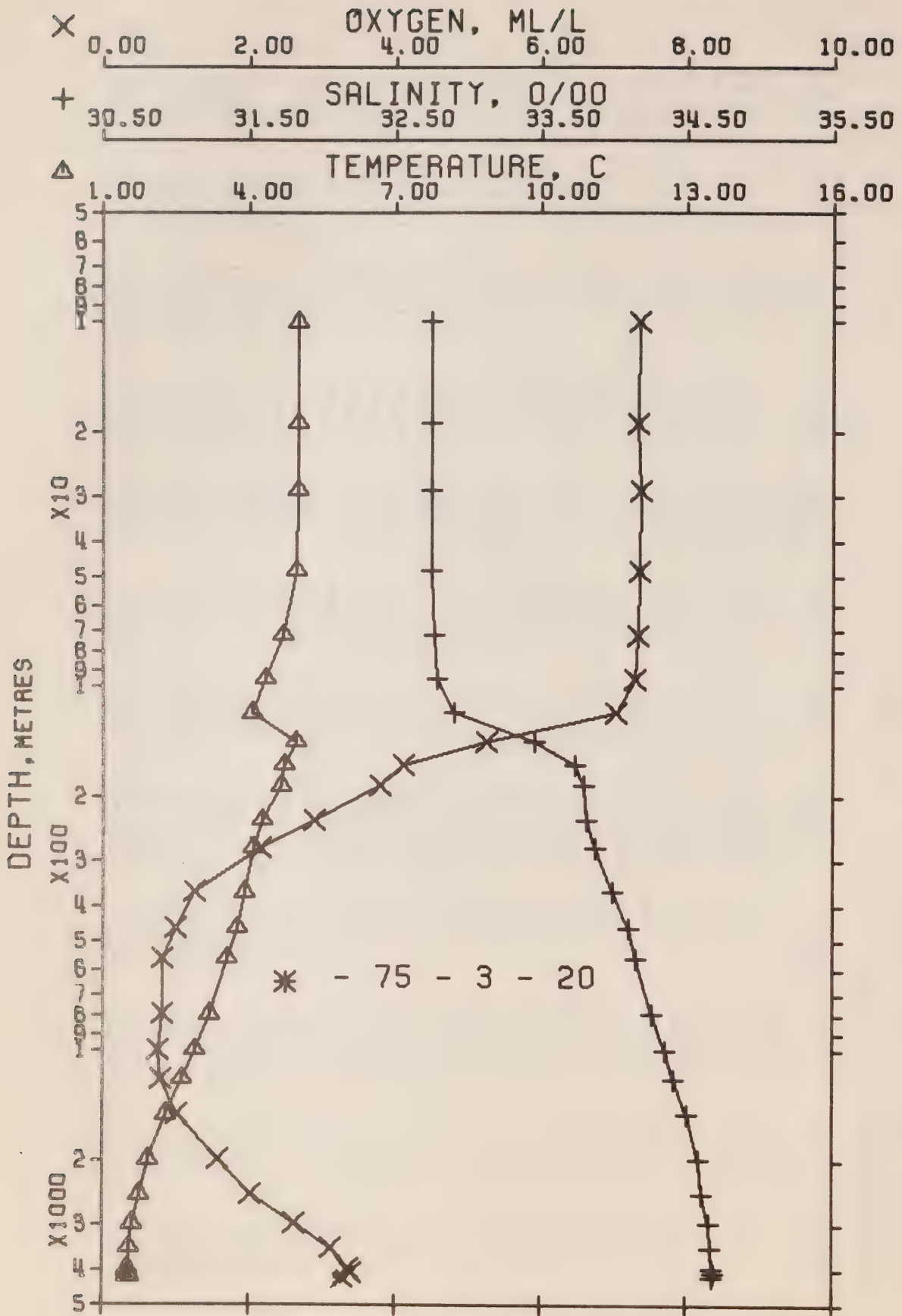


OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50- 0.0 N, 145- 0.0 W GMT 18.0
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75- 3- 17

DATE 23/ 4/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. FN	OXY	SOUND
2	4.87	32.726	0	25.914	210.0	4.87	209.8	0.0	0.0	7.28	1467.
10	4.87	32.729	10	25.916	209.9	4.87	209.5	0.21	0.01	7.36	1468.
20	4.88	32.730	20	25.916	210.0	4.88	209.5	0.42	0.04	7.36	1468.
30	4.86	32.730	30	25.918	209.9	4.86	209.4	0.63	0.10	7.35	1468.
50	4.86	32.730	50	25.918	210.0	4.86	209.4	1.06	0.27	7.35	1468.
74	4.85	32.729	74	25.919	210.2	4.84	209.3	1.57	0.59	7.35	1469.
100	4.42	32.761	99	25.990	203.6	4.41	202.5	2.00	1.06	7.33	1467.
125	3.85	32.848	124	26.116	191.6	3.84	190.5	2.59	1.64	7.24	1465.
151	5.16	33.570	150	26.549	151.3	5.15	149.3	3.04	2.26	5.18	1472.
176	5.04	33.703	175	26.739	133.5	5.03	131.3	3.39	2.85	4.33	1472.
201	4.75	33.808	200	26.784	129.5	4.73	127.1	3.72	3.49	3.88	1472.
252	4.28	33.828	250	26.850	123.4	4.26	120.7	4.36	4.96	2.93	1471.
303	4.21	33.896	301	26.904	118.8	4.19	115.6	4.98	6.72	1.97	1471.
405	4.07	34.002	402	27.010	109.4	4.04	105.5	6.14	10.92	1.13	1472.
507	3.76	34.090	503	27.112	100.4	3.72	95.8	7.21	15.88	1.11	1473.
609	3.52	34.153	604	27.185	94.0	3.49	88.8	8.20	21.52	1.07	1474.
794	3.21	34.283	787	27.318	82.3	3.16	76.1	9.83	33.15	0.85	1470.
996	2.88	34.377	986	27.424	73.1	2.81	66.0	11.30	47.34	0.76	1473.
1196	2.65	34.434	1184	27.489	67.6	2.57	59.7	12.79	63.04	0.80	1480.
1497	2.32	34.510	1481	27.578	59.7	2.22	51.1	14.70	89.23	0.94	1494.
1998	1.98	34.595	1974	27.665	52.4	1.84	42.7	17.47	138.70	1.53	1491.
2497	1.76	34.623	2464	27.713	48.8	1.58	38.0	19.98	196.26	2.15	1498.
2998	1.61	34.656	2955	27.750	45.9	1.39	34.1	22.35	262.41	2.68	1506.
3500	1.54	34.671	3445	27.768	45.3	1.27	32.2	24.62	337.79	3.09	1514.
4004	1.52	34.679	3937	27.775	45.8	1.20	31.1	26.90	424.85	3.31	1523.
4106	1.52	34.673	4036	27.771	46.5	1.18	31.5	27.37	444.26	3.35	1525.
4197	1.52	34.633	4125	27.770	46.0	1.17	30.6	27.79	461.86		1526.
4207	1.52	34.674	4135	27.771	46.7	1.17	31.3	27.83	463.89	3.25+	1526.



DATE 29/ 4/75

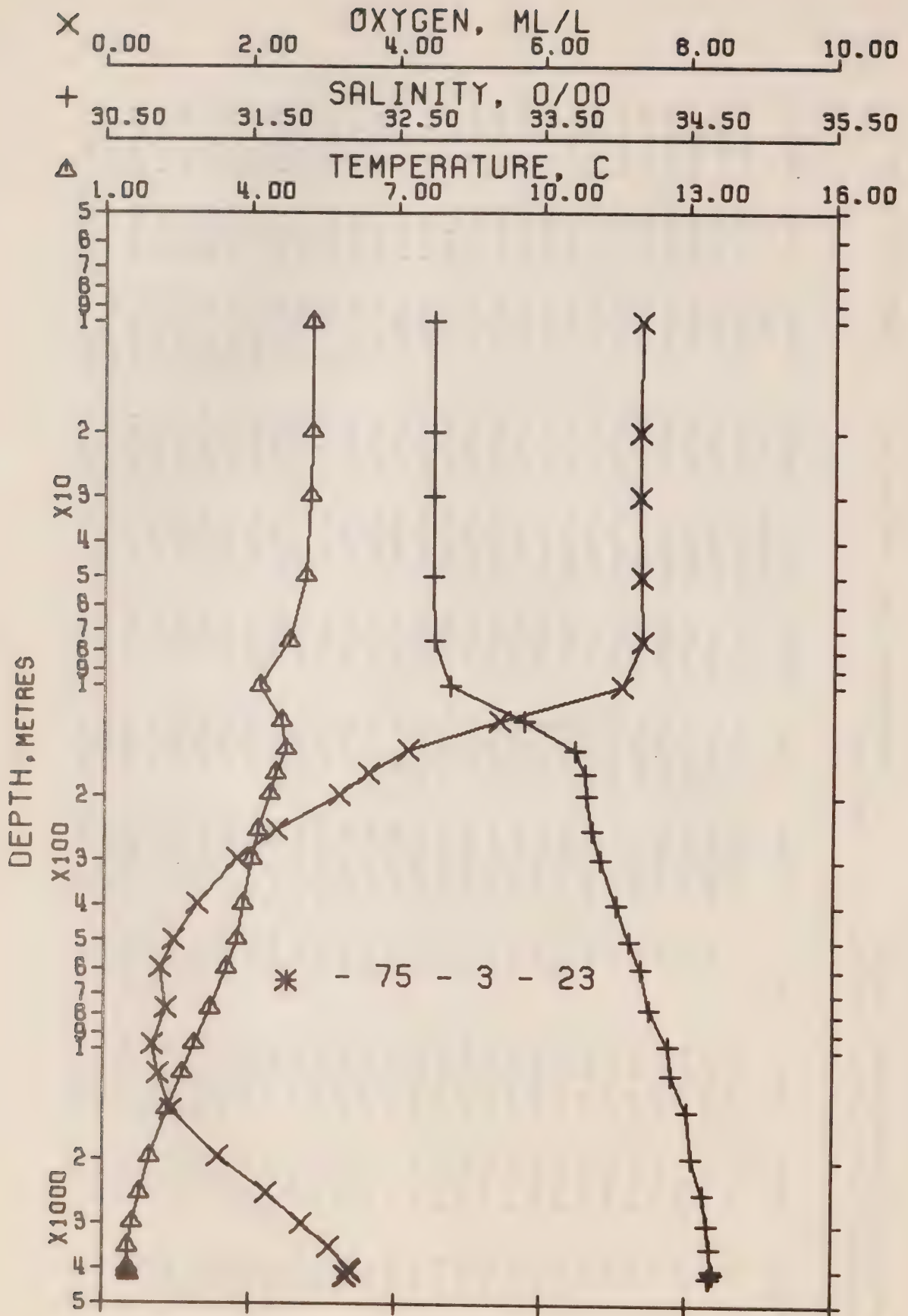
REFERENCE NO. 75- 3- 20

OFFSHORE OCEANOGRAPHY GROUP

POSITION 50- 0.0 N, 145- 0.0 W GMT 18.2

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.02	32.750	0	25.916	209.8	5.02	209.5	0.0	0.0	7.31	1469.
10	4.99	32.748	10	25.918	209.7	4.99	209.4	0.21	0.01	7.35	1468.
19	5.00	32.750	19	25.919	209.8	5.00	209.4	0.40	0.04	7.34	1468.
29	4.99	32.749	29	25.919	209.9	4.99	209.3	0.61	0.09	7.38	1468.
48	4.96	32.746	48	25.920	209.9	4.96	209.2	1.01	0.25	7.36	1469.
72	4.68	32.771	72	25.970	205.3	4.67	204.4	1.52	0.56	7.33	1468.
96	4.33	32.792	96	26.024	200.3	4.32	199.3	1.99	0.96	7.31	1467.
119	4.05	32.911	118	26.147	188.8	4.04	187.6	2.44	1.46	7.03	1466.
142	4.95	33.465	141	26.490	156.8	4.94	155.0	2.84	1.99	5.25	1471.
165	4.71	33.741	164	26.735	133.7	4.70	131.7	3.18	2.51	4.11	1471.
188	4.67	33.803	187	26.789	128.9	4.66	126.6	3.48	3.06	3.80	1471.
234	4.26	33.325	232	26.850	123.2	4.24	120.7	4.05	4.28	2.89	1470.
279	4.10	33.876	277	26.907	118.1	4.08	115.3	4.60	5.72	2.17	1470.
370	3.90	34.004	367	27.029	107.2	3.87	103.6	5.62	9.09	1.26	1471.
464	3.77	34.109	460	27.126	98.8	3.74	94.4	6.58	13.18	1.00	1472.
561	3.56	34.156	556	27.184	93.8	3.52	88.9	7.51	18.05	0.81	1473.
800	3.20	34.270	793	27.309	83.2	3.14	76.9	9.63	32.74	0.82	1476.
1005	2.89	34.365	995	27.413	74.1	2.82	67.0	11.23	47.48	0.76	1478.
1209	2.61	34.419	1197	27.481	68.2	2.53	60.5	12.68	63.88	0.80	1480.
1515	2.29	34.508	1498	27.579	59.6	2.19	51.1	14.63	90.86	1.01	1484.
2022	1.94	34.595	1997	27.677	51.3	1.80	41.6	17.40	140.72	1.57	1491.
2527	1.76	34.613	2493	27.705	49.5	1.58	38.7	19.93	199.66	2.01	1499.
3033	1.61	34.660	2989	27.754	45.8	1.38	33.8	22.34	267.81	2.62	1507.
3541	1.54	34.675	3485	27.771	45.1	1.27	31.8	24.63	344.69	3.11	1515.
4050	1.52	34.684	3982	27.779	45.6	1.19	30.6	26.95	434.19	3.36	1524.
4153	1.52	34.688	4082	27.783	45.5	1.18	30.3	27.41	453.71	3.39	1525.
4245	1.52	34.680*	4172	27.776	46.3	1.17	30.8	27.83	471.78		1527.
4256	1.53	34.679	4182	27.775	46.6	1.18	31.0	27.88	473.85	3.28+	1527.



OFFSHORE OCEANOGRAPHY GROUP
 POSITION 50- 0.0 N. 145- 0.0 W GMT 18.0
 HYDROGRAPHIC CAST DATA

REFERENCE NO. 75- 3- 23

DATE 5/ 5/75

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.26	32.750	0	25.889	212.4	5.26	212.2	0.0	0.0	7.29	1469.
10	5.23	32.753	10	25.895	211.9	5.23	211.5	0.21	0.01	7.36	1469.
20	5.24	32.750	20	25.892	212.3	5.24	211.9	0.43	0.04	7.34	1469.
30	5.21	32.750	30	25.895	212.1	5.21	211.5	0.64	0.10	7.34	1469.
50	5.11	32.748	50	25.905	211.3	5.11	210.6	1.07	0.27	7.36	1469.
75	4.77	32.756	75	25.949	207.3	4.76	206.5	1.60	0.61	7.38	1468.
101	4.18	32.869	100	26.100	193.1	4.17	192.1	2.10	1.07	7.10	1466.
126	4.63	33.384	125	26.461	159.2	4.62	157.7	2.55	1.58	5.42	1469.
150	4.73	33.728	149	26.723	134.7	4.72	133.0	2.90	2.08	4.16	1471.
175	4.50	33.802	174	26.806	127.0	4.49	125.0	3.23	2.62	3.61	1470.
200	4.39	33.815	199	26.828	125.1	4.38	122.8	3.54	3.23	3.22	1470.
251	4.15	33.846	249	26.878	120.7	4.13	118.1	4.16	4.65	2.36	1470.
301	4.04	33.915	299	26.944	114.7	4.02	111.8	4.76	6.32	1.82	1470.
401	3.85	34.017	398	27.045	106.0	3.82	102.2	5.86	10.26	1.27	1471.
502	3.73	34.115	498	27.135	98.2	3.69	93.6	6.89	15.00	0.95	1473.
603	3.53	34.188	598	27.212	91.4	3.49	86.2	7.84	20.38	0.78	1474.
730	3.20	34.252	773	27.295	84.4	3.15	78.3	9.39	31.34	0.86	1475.
977	2.87	34.377	968	27.424	72.8	2.80	66.0	10.94	45.15	0.67	1477.
1178	2.62	34.405	1166	27.469	69.1	2.54	61.6	12.36	60.74	0.75	1480.
1482	2.33	34.506	1466	27.574	60.0	2.23	51.5	14.32	87.29	0.93	1483.
1998	1.97	34.544	1974	27.633	55.3	1.83	45.7	17.26	139.72	1.58	1491.
2521	1.75	34.624	2487	27.714	48.6	1.57	37.8	19.97	201.90	2.23	1498.
3043	1.60	34.655	2999	27.750	46.0	1.37	34.1	22.42	271.54	2.71	1507.
3560	1.52	34.675	3504	27.772	44.9	1.24	31.7	24.75	350.12	3.09	1515.
4068	1.51	34.681	3999	27.778	45.6	1.18	30.8	27.05	439.24	3.37	1524.
4167	1.52	34.686	4096	27.781	45.7	1.18	30.5	27.50	458.27	3.39	1526.
4257	1.53	34.665	4183	27.764	47.6	1.18	32.0	27.92	476.19	3.34+	1527.
4266	1.53	34.666	4192	27.764	47.6	1.18	31.9	27.96	478.10	3.31+	1527.

BATHYTHERMOGRAPH OBSERVATIONS

(P-75-3)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all B.T.'s taken on Line P outbound and inbound, and one a day on Station P.

Although B.T.'s at Station P were taken every three hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes force the cancellation of a B.T., in that case an X.B.T. was taken. These X.B.T.'s are shown following the B.T.'s.

EXPLANATION OF HEADINGS

Example: 0030/ 13-04-74

48° 34' N.

125° 30' W.

0030 = Time in GMT

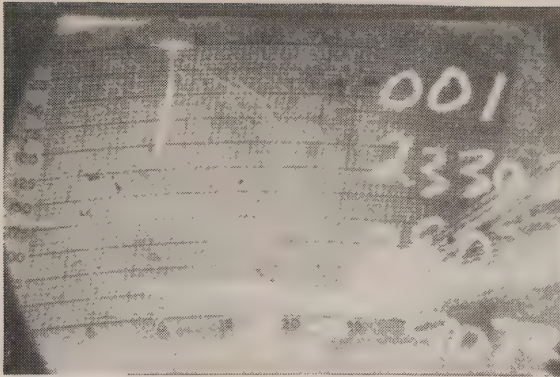
13 = Day

04 = Month

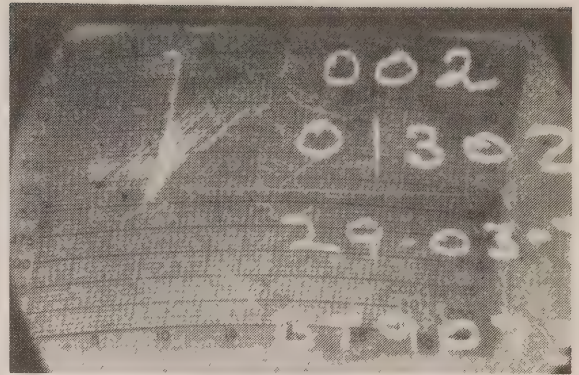
74 = Year

48° 34' N. = Latitude

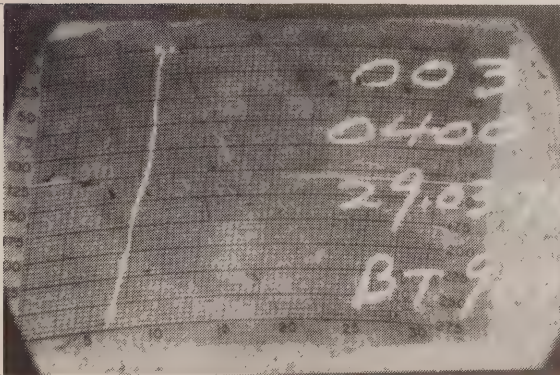
125° 30' W. = Longitude



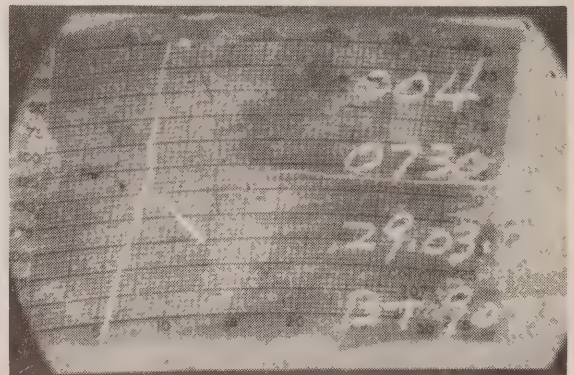
2330 / 28-03-75
48° 33' N.
125° 33' W.



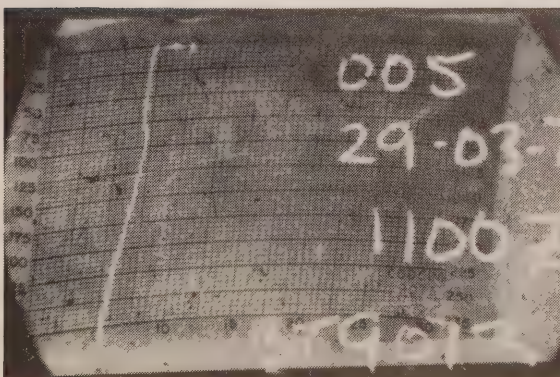
0130 / 29-03-75
48° 38' N.
126° 00' W.



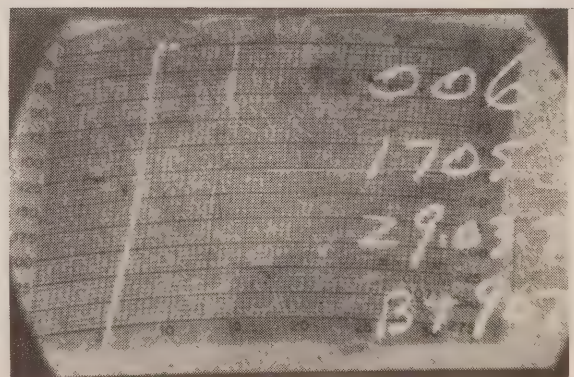
0400 / 29-03-75
48° 42' N.
126° 40' W.



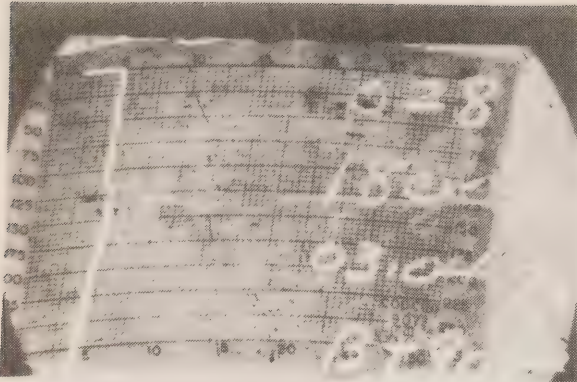
0730 / 29-03-75
48° 46' N.
127° 40' W.



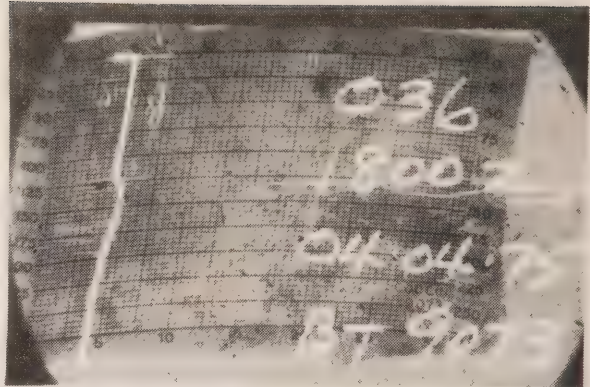
1100 / 29-03-75
48° 51' N.
128° 40' W.



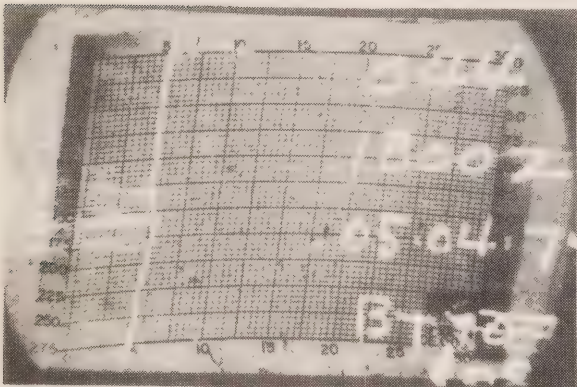
1705 / 29-03-75
49° 02' N.
130° 40' W.



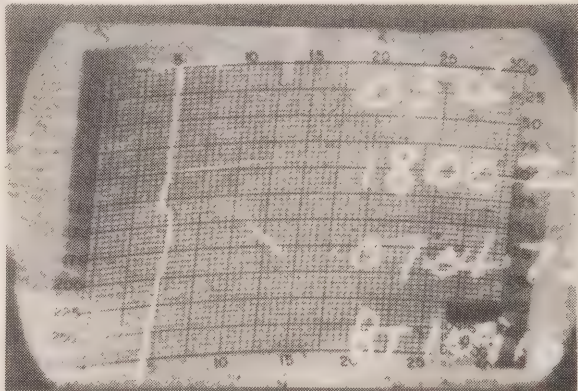
1800 / 03-04-75
 50° 08' N.
 145° 15' W.



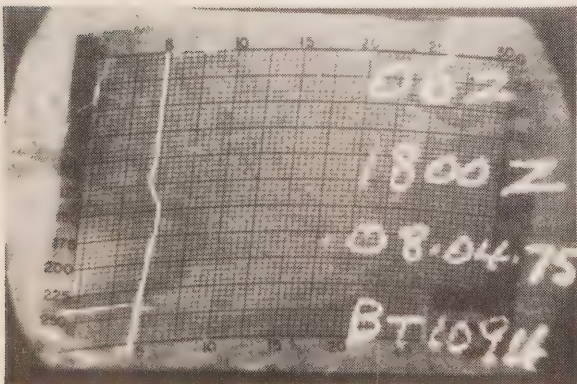
1800 / 04-04-75
 50° 05' N.
 145° 06' W.



1800 / 05-04-75
 49° 54' N.
 145° 00' W.



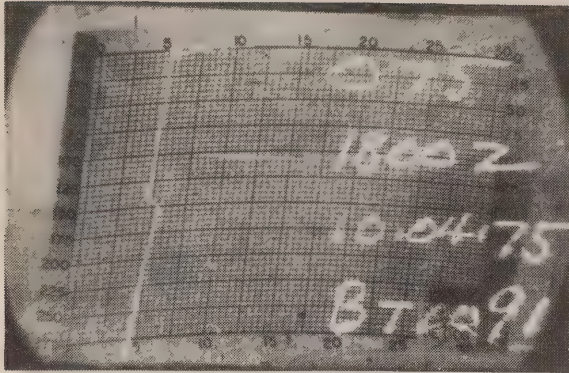
1800 / 07-04-75
 50° 00' N.
 145° 07' W.



1800 / 08-04-75
 50° 14' N.
 145° 05' W.



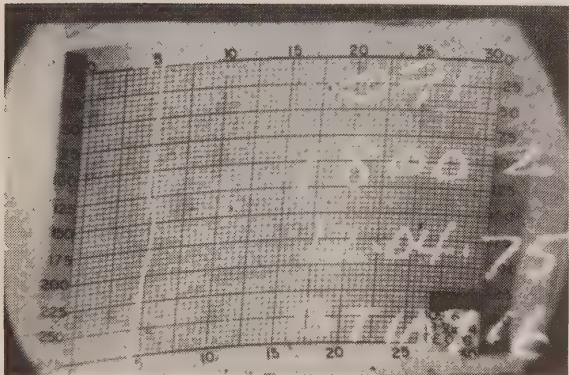
1800 / 09-04-75
 49° 51' N.
 145° 07' W.



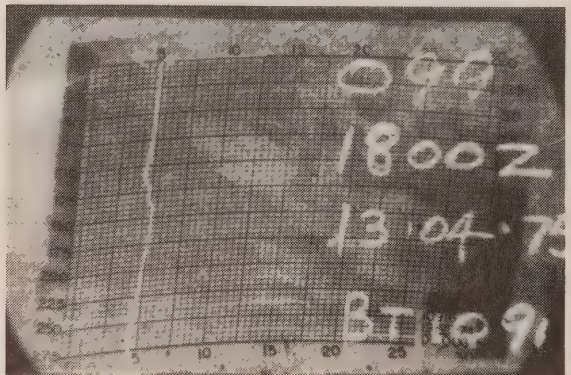
1800 / 10-04-75
 49° 53' N.
 145° 00' W.



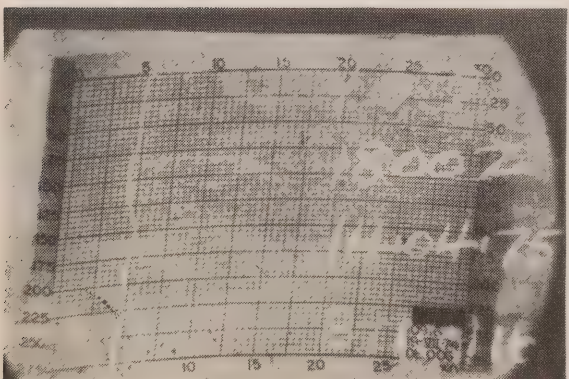
1800 / 11-04-75
 50° 05' N.
 145° 00' W.



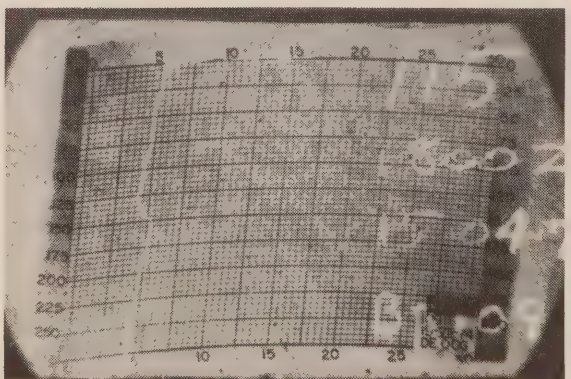
1800 / 12-04-75
 50° 00' N.
 144° 57' W.



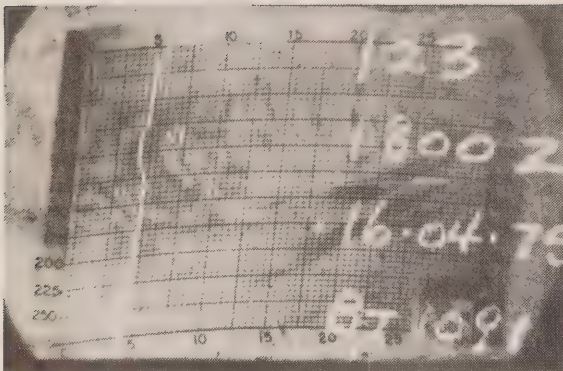
1800 / 13-04-75
 50° 04' N.
 145° 05' W.



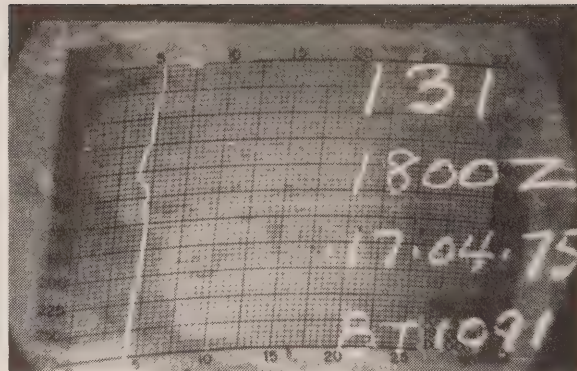
1800 / 14-04-75
 50° 05' N.
 145° 05' W.



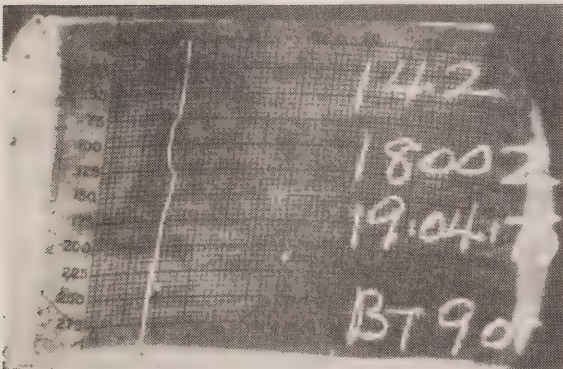
1800 / 15-04-75
 49° 55' N.
 145° 08' W.



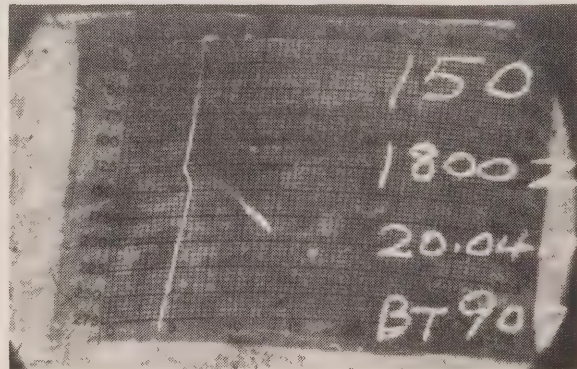
1800 / 16-04-75
50° 00' N.
145° 00' W.



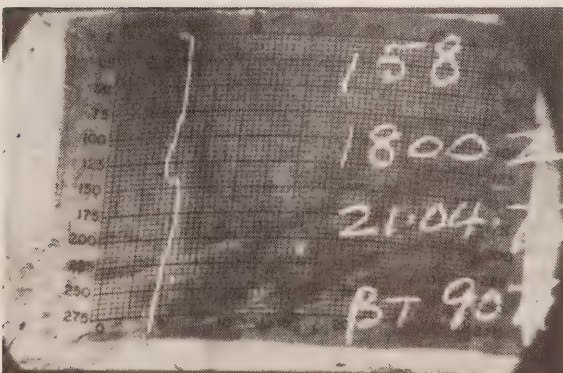
1800 / 17-04-75
50° 00' N.
145° 00' W.



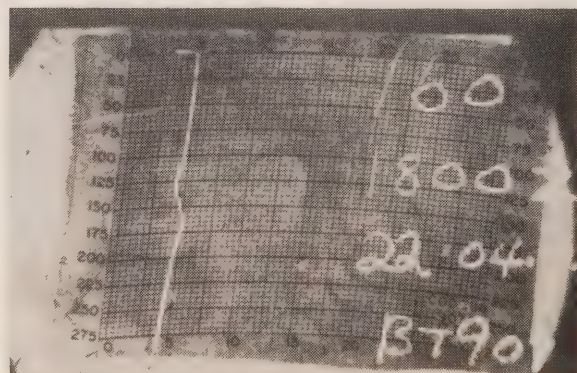
1800 / 19-04-75
49° 58' N.
145° 05' W.



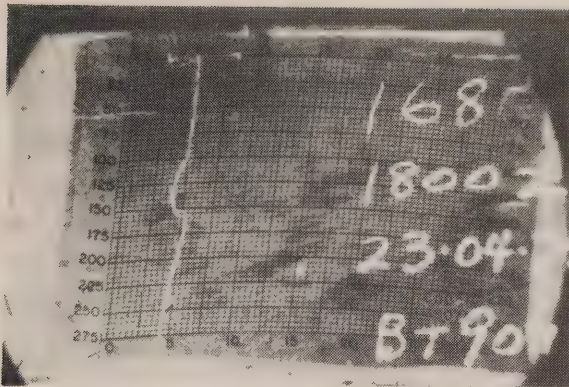
1800 / 20-04-75
49° 52' N.
145° 08' W.



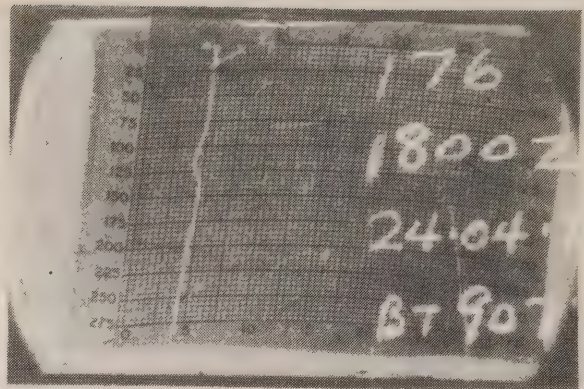
1800 / 21-04-75
49° 51' N.
144° 55' W.



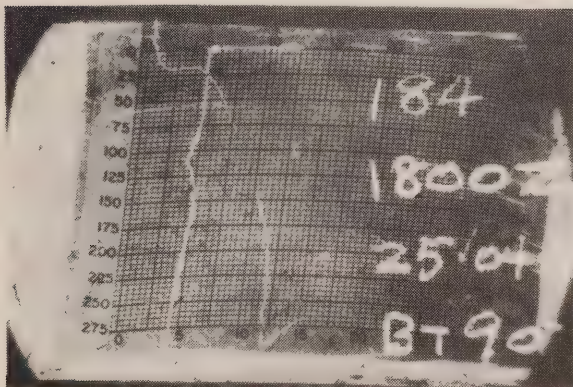
1800 / 22-04-75
50° 05' N.
145° 19' W.



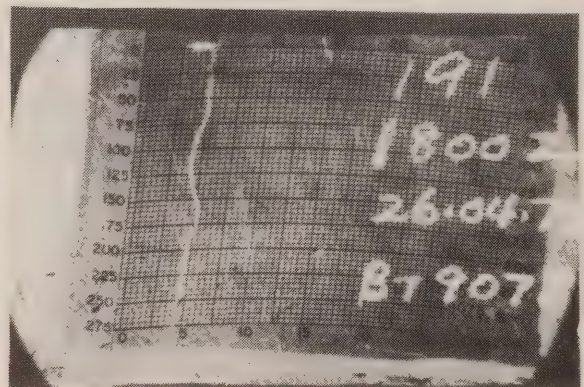
1800 / 23-04-75
 49° 55' N.
 144° 53' W.



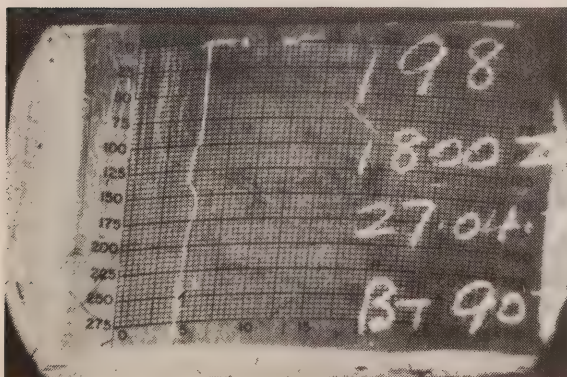
1800 / 24-04-75
 49° 57' N.
 145° 06' W.



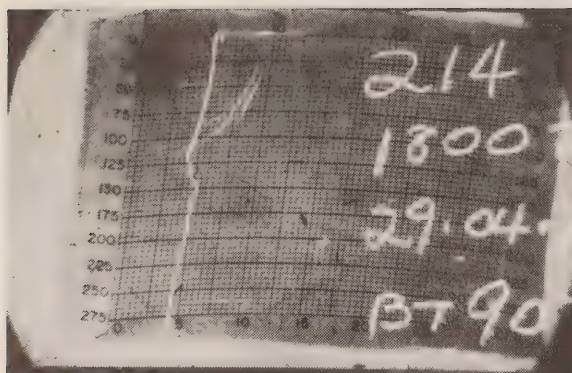
1800 / 25-04-75
 50° 00' N.
 144° 54' W.



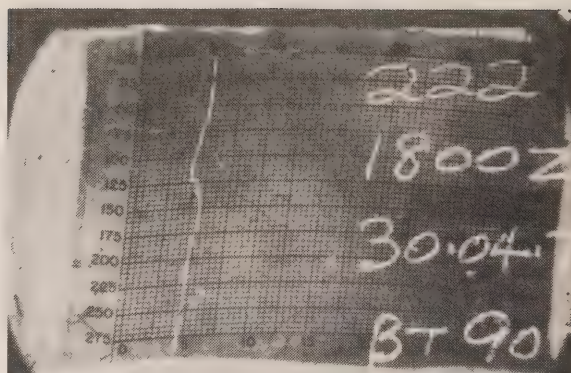
1800 / 26-04-75
 49° 57' N.
 145° 20' W.



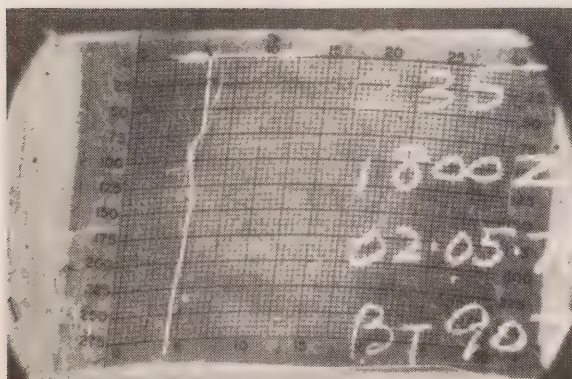
1800 / 27-04-75
 49° 58' N.
 145° 07' W.



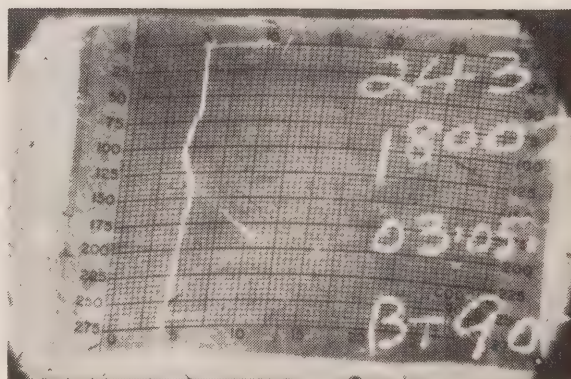
1800 / 29-04-75
49° 58' N.
144° 55' W.



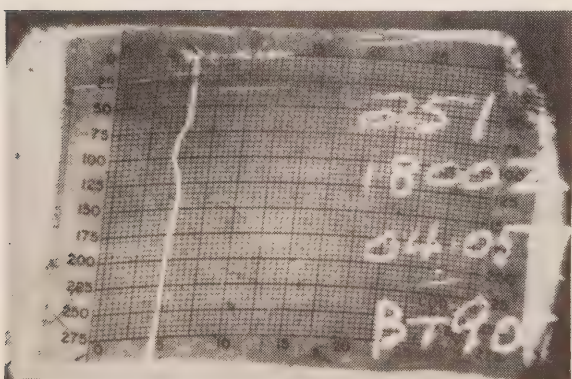
1800 / 30-04-75
50° 01' N.
145° 03' W.



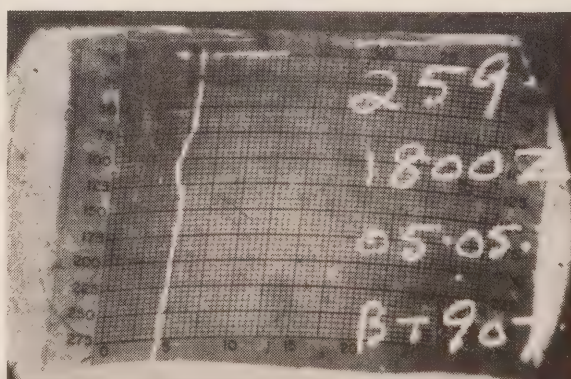
1800 / 02-05-75
50° 00' N.
145° 00' W.



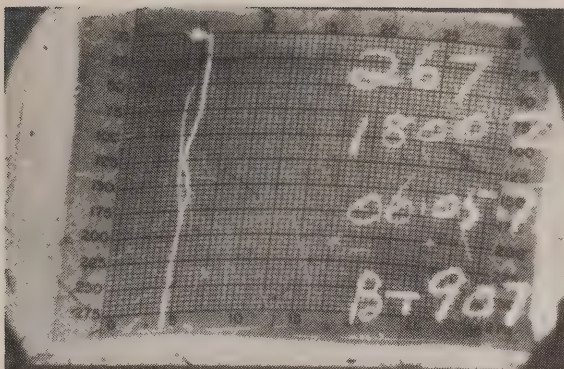
1800 / 03-05-75
49° 52' N.
144° 57' W.



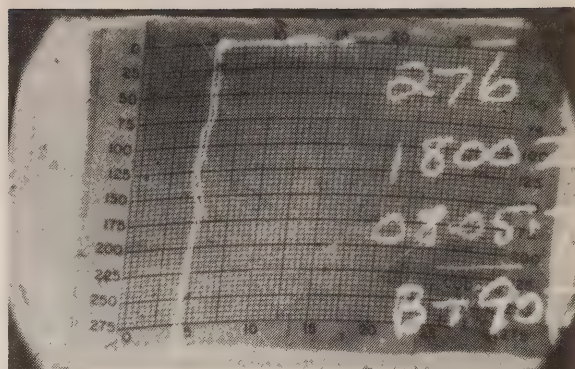
1800 / 04-05-75
49° 55' N.
144° 55' W.



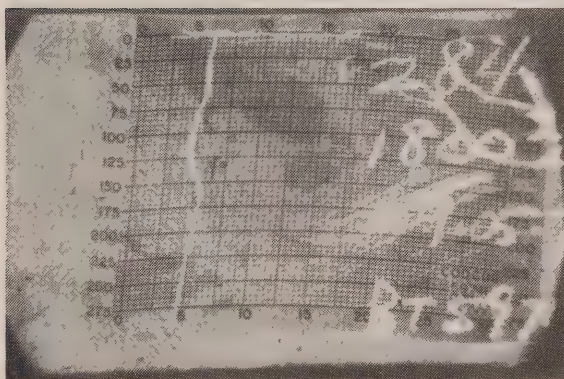
1800 / 05-05-75
50° 00' N.
145° 00' W.



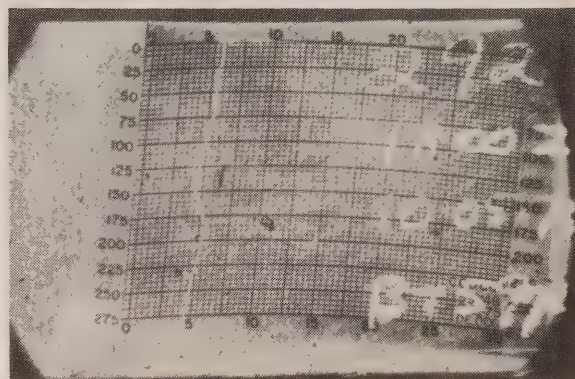
1800 / 06-05-75
49° 53' N.
145° 04' W.



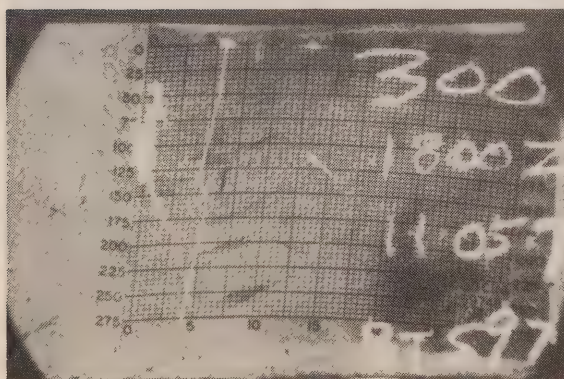
1800 / 08-05-75
49° 55' N.
145° 05' W.



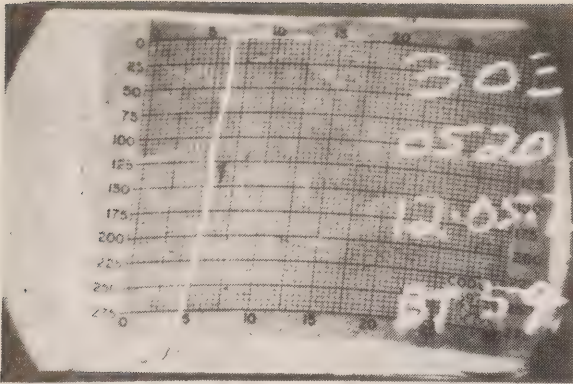
1800 / 09-05-75
50° 00' N.
145° 00' W.



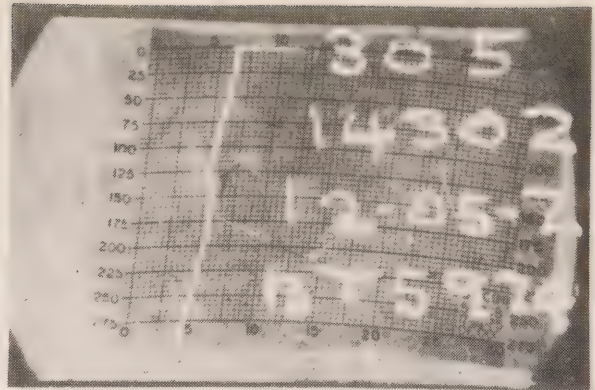
1800 / 10-05-75
49° 58' N.
145° 05' W.



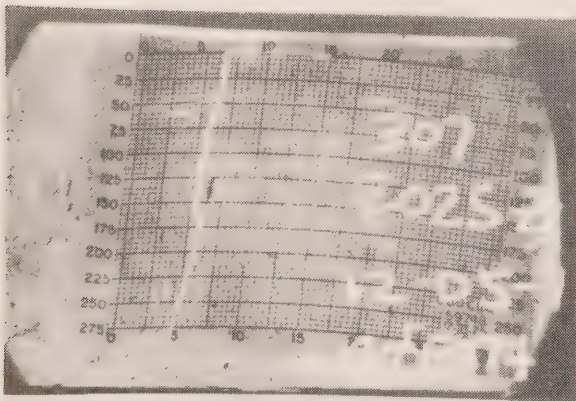
1800 / 11-05-75
50° 03' N.
144° 42' W.



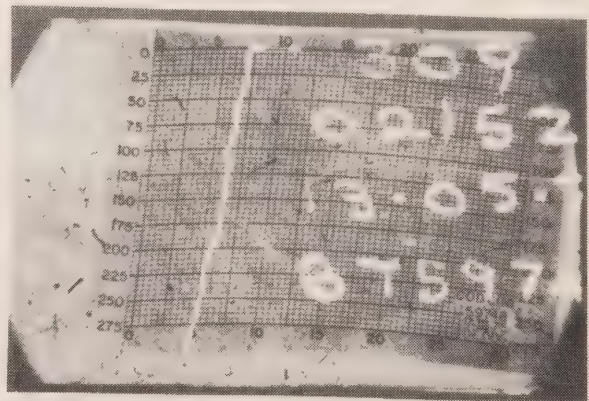
0520 / 12-05-75
 49° 49' N.
 142° 40' W.



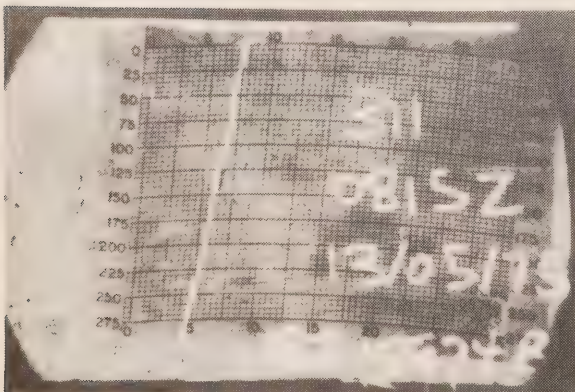
1430 / 12-05-75
 49° 41' N.
 140° 40' W.



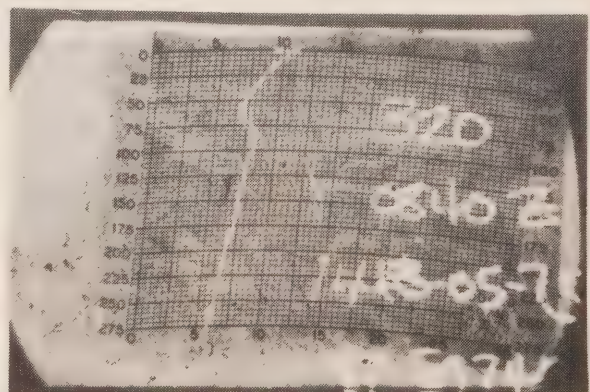
2025 / 12-05-75
 49° 34' N.
 138° 40' W.



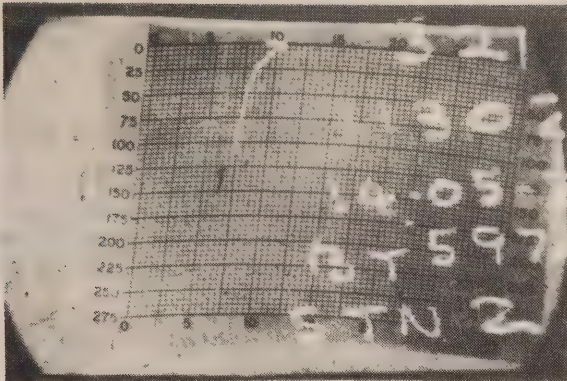
0215 / 13-05-75
 49° 26' N.
 136° 40' W.



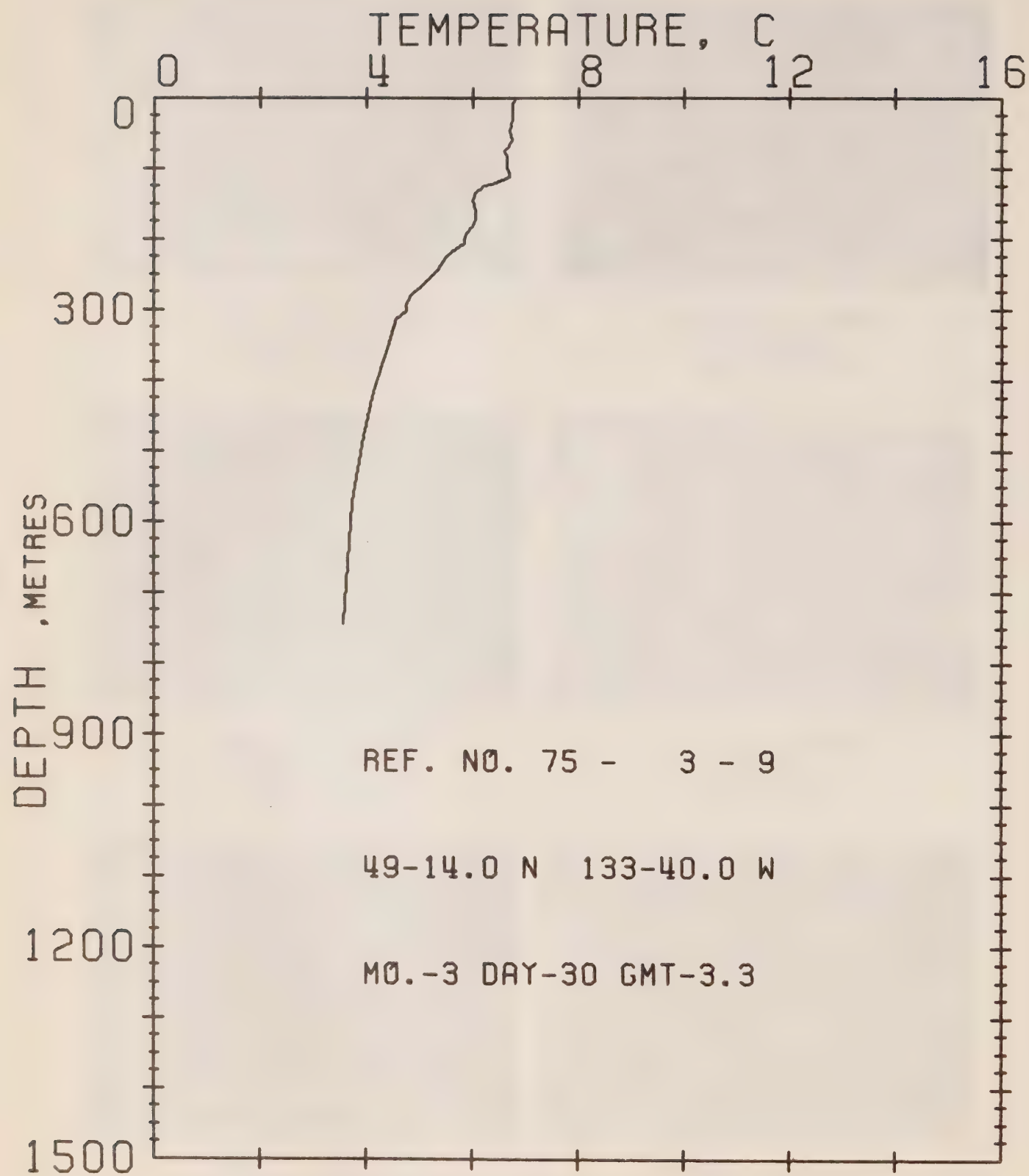
0815 / 13-05-75
 49° 17' N.
 134° 40' W.



0840 / 14-05-75
 48° 42' N.
 126° 40' W.



1130 / 14-05-75
48° 38' N.
126° 00' W.



OFFSHORE OCEANOGRAPHY

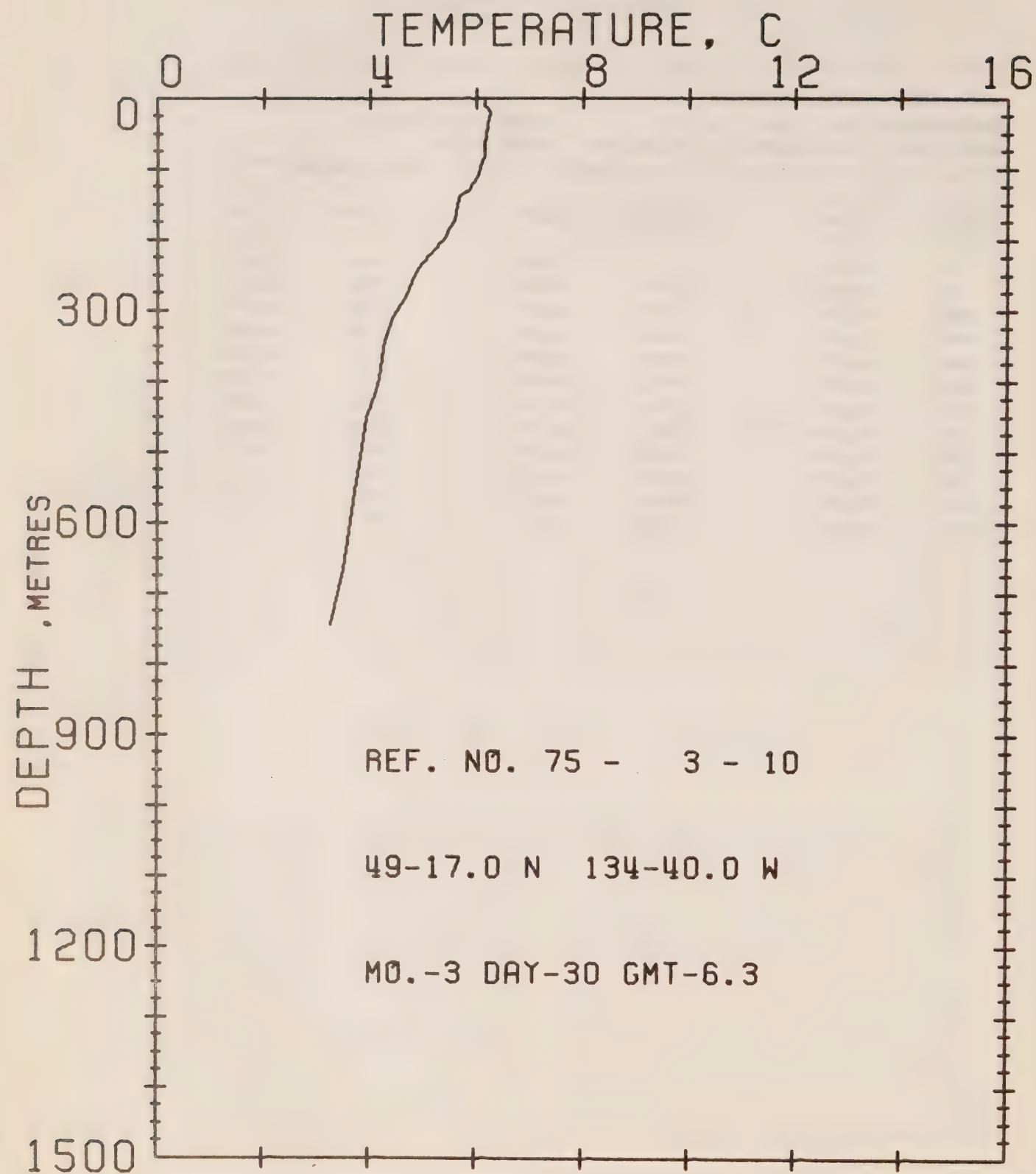
REFERENCE NO. 75- 3- 9

DATE 30/ 3/75

POSITION 49-14.0N 133-40.0W GMT 03.3

RESULTS OF XBT CAST 36 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	6.80	112	6.69	243	5.34
8	6.75	119	6.42	260	5.12
30	6.75	123	6.21	278	4.85
48	6.69	133	6.05	292	4.74
59	6.75	146	5.99	301	4.74
66	6.69	162	6.05	313	4.57
72	6.64	174	6.05	340	4.46
75	6.59	181	5.99	354	4.41
82	6.64	193	5.88	415	4.13
92	6.64	207	5.83	479	3.96
101	6.64	218	5.61	571	3.74
108	6.69	226	5.50	744	3.57



OFFSHORE OCEANOGRAPHY

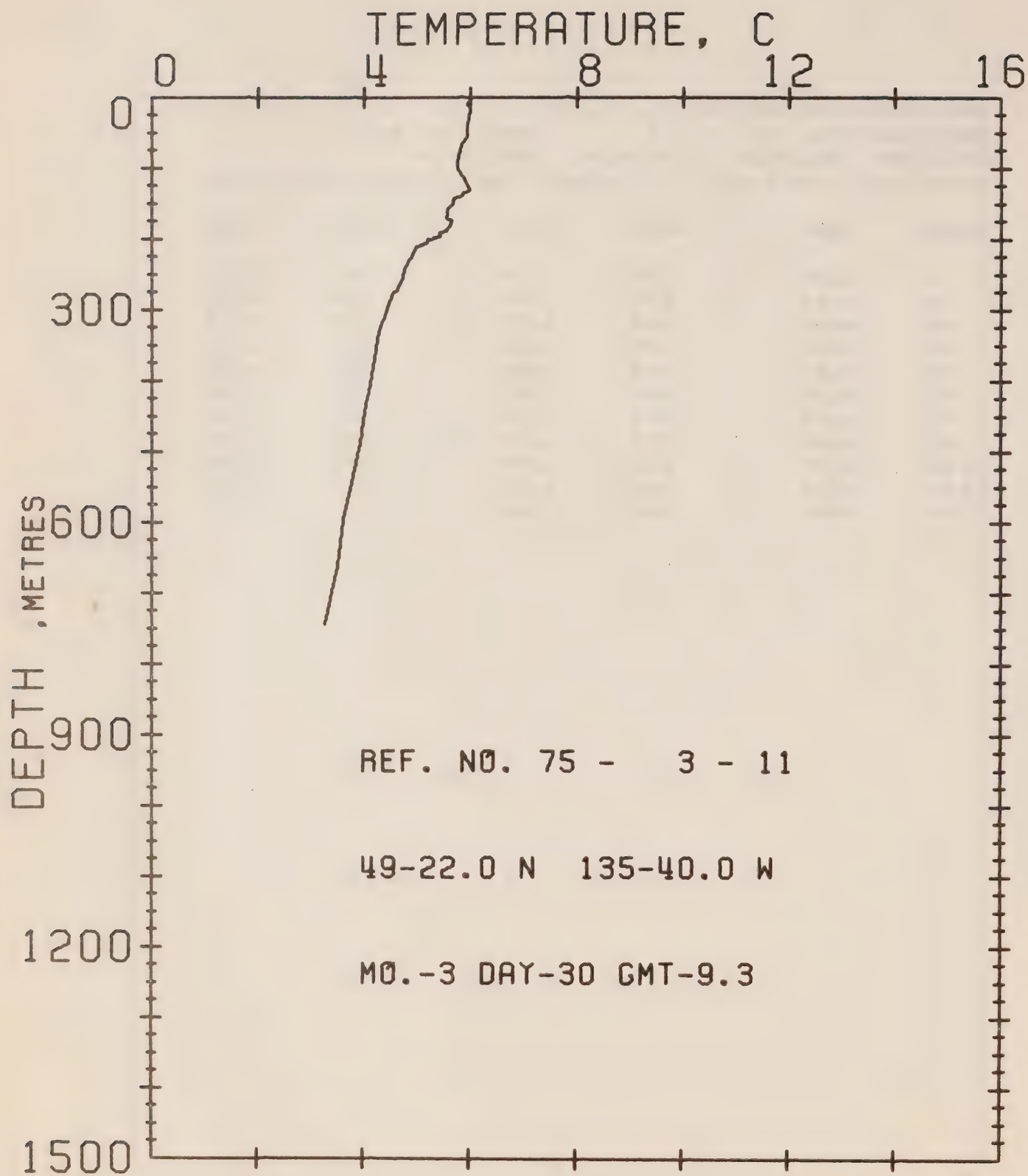
REFERENCE NO. 75- 3- 10

DATE 30/ 3/75

POSITION 49-17.0N 134-40.0W GMT 06.3

RESULTS OF XBT CAST 32 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	6.15	134	5.77	343	4.30
10	6.15	139	5.72	367	4.24
15	6.21	142	5.67	397	4.18
20	6.26	174	5.61	414	4.13
38	6.21	183	5.50	451	3.96
65	6.15	195	5.45	507	3.85
81	6.15	223	5.12	556	3.74
92	6.10	242	4.90	611	3.63
109	6.05	260	4.79	665	3.52
121	5.94	281	4.68	743	3.29
129	5.88	308	4.46		



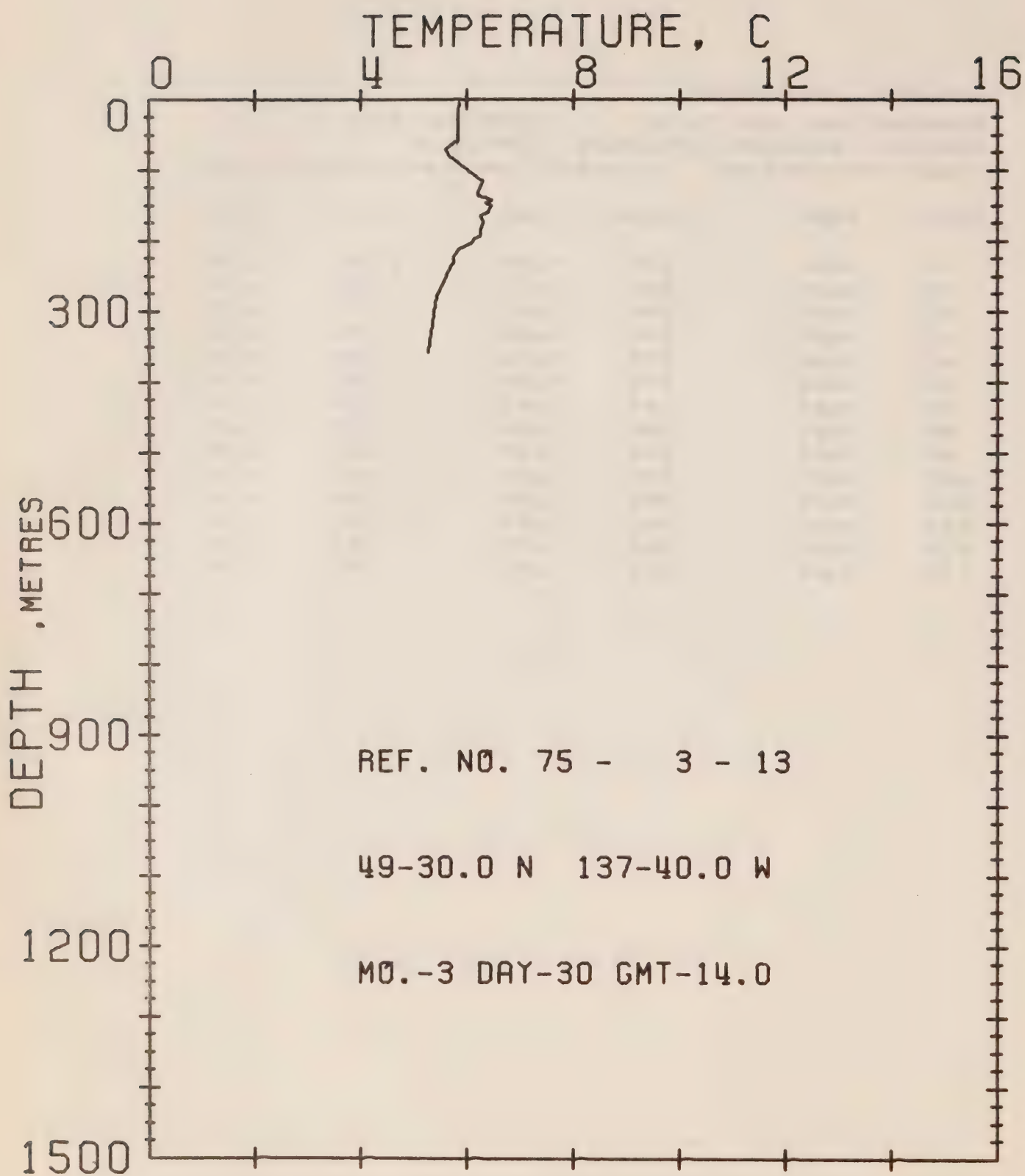
OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 3- 11 DATE 30/ 3/75

POSITION 49-22.0N 135-40.0W GMT 09.3

RESULTS OF XBT CAST 42 PCINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.99	138	5.88	238	4.79
10	5.94	142	5.72	253	4.74
14	5.99	150	5.67	272	4.63
17	5.99	159	5.56	276	4.57
41	5.94	170	5.56	299	4.46
55	5.94	173	5.67	332	4.30
63	5.88	183	5.61	357	4.24
67	5.83	188	5.56	405	4.13
89	5.77	190	5.45	443	4.02
100	5.77	195	5.45	488	3.96
112	5.88	200	5.23	544	3.80
123	5.94	207	5.18	595	3.63
130	5.99	210	5.01	662	3.52
135	5.88	218	4.96	743	3.29



OFFSHORE OCEANOGRAPHY

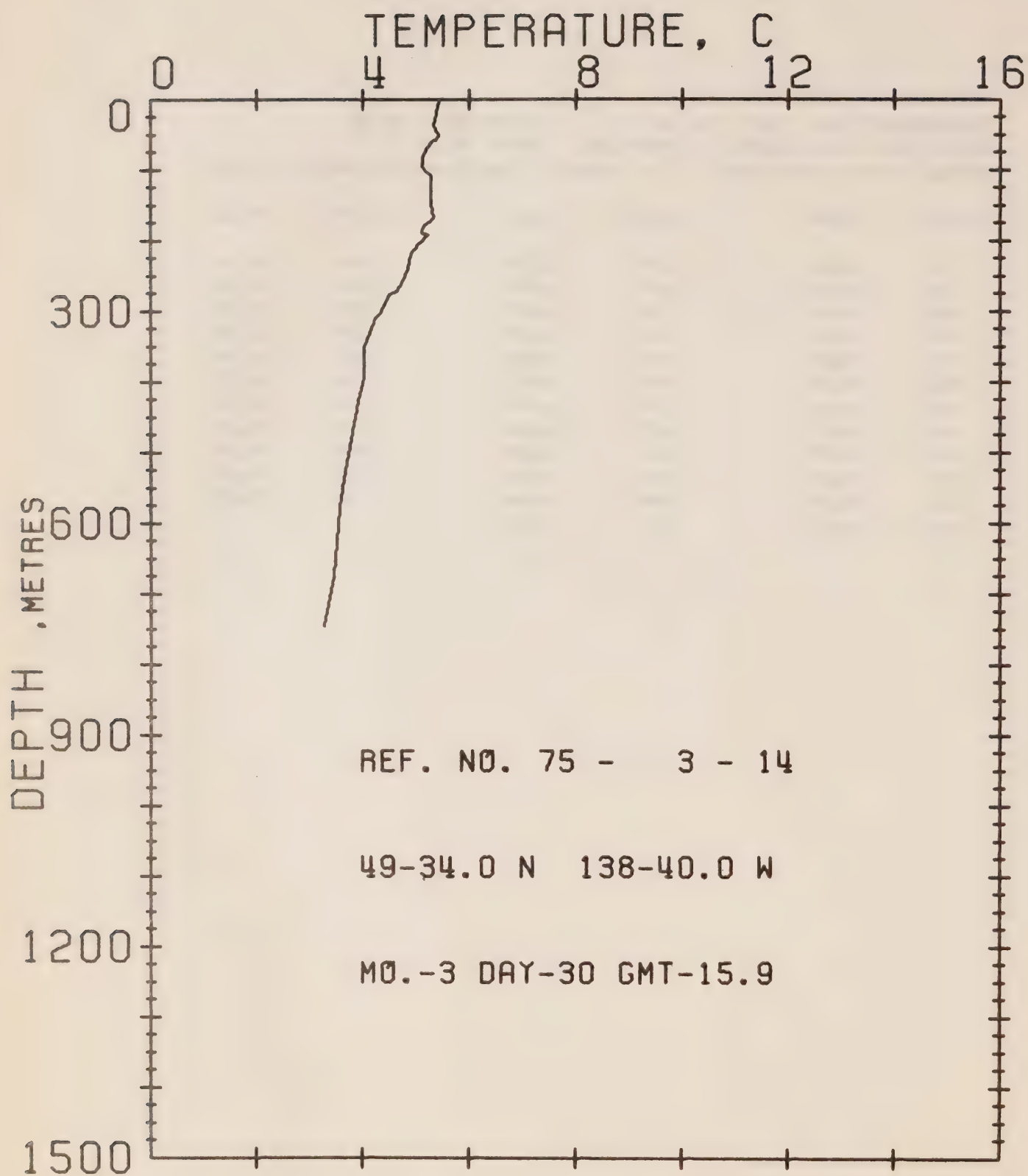
REFERENCE NO. 75- 3- 13

DATE 30/ 3/75

POSITION 49-30.0N 137-40.0W GMT 14.0

RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.88	123	6.26	196	6.15
20	5.83	129	6.21	201	6.10
43	5.83	135	6.21	203	6.05
52	5.83	138	6.37	207	5.99
58	5.83	141	6.48	212	5.88
66	5.67	145	6.37	223	5.77
72	5.61	149	6.48	232	5.77
80	5.67	157	6.42	241	5.67
88	5.83	164	6.26	256	5.61
98	5.99	174	6.32	278	5.45
110	6.21	186	6.26	358	5.28
115	6.32	191	6.26		



OFFSHORE OCEANOGRAPHY

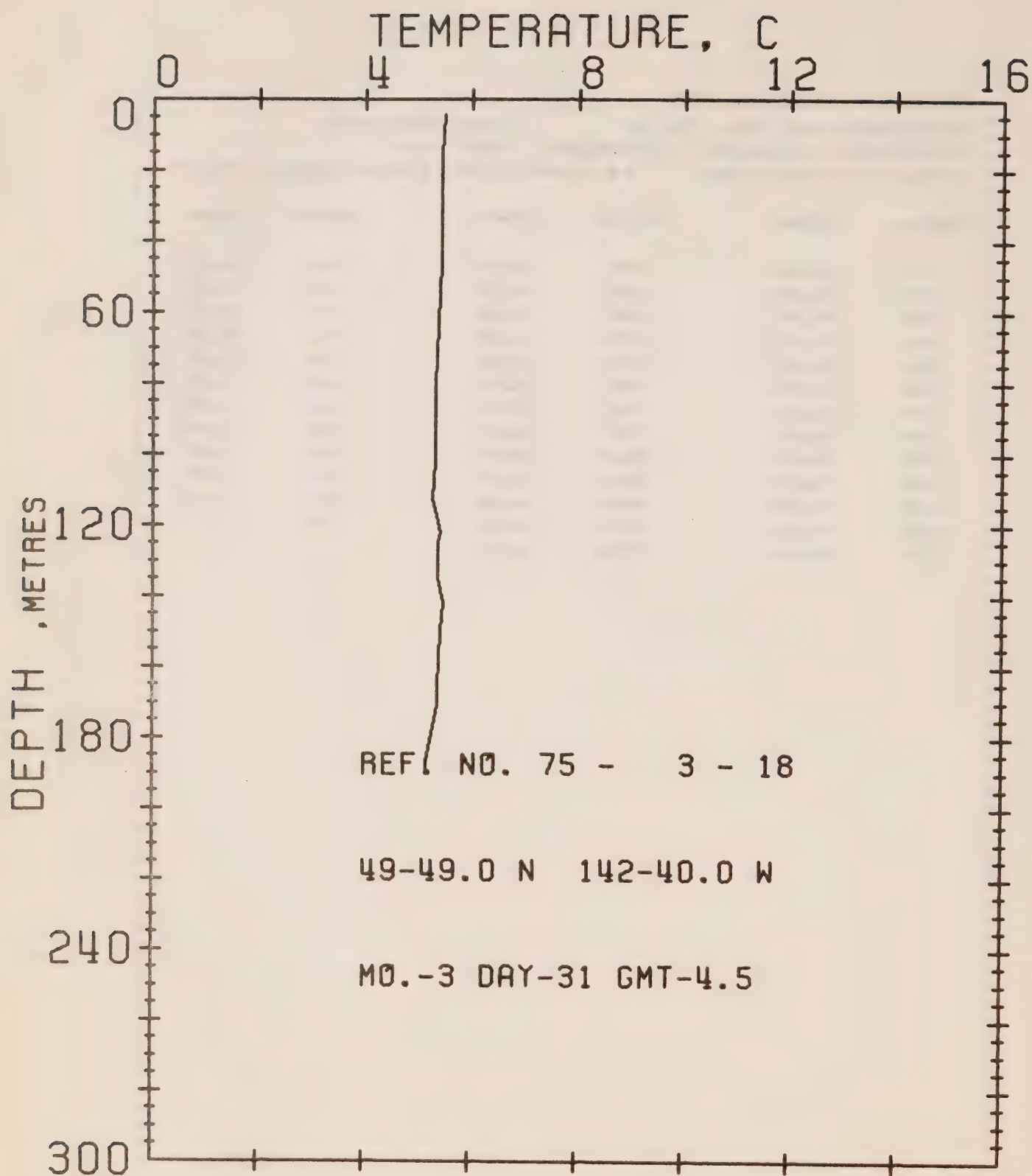
REFERENCE NO. 75- 3- 14

DATE 30/ 3/75

POSITION 49-34.0N 138-40.0W GMT 15.9

RESULTS OF XBT CAST 38 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.45	139	5.28	301	4.35
20	5.39	148	5.28	310	4.24
38	5.34	168	5.34	333	4.13
45	5.39	178	5.18	352	4.02
51	5.45	183	5.12	394	4.02
62	5.28	187	5.12	428	3.91
74	5.18	191	5.23	481	3.80
84	5.12	205	5.07	526	3.68
95	5.12	219	4.90	578	3.57
100	5.18	240	4.85	628	3.52
107	5.28	260	4.74	675	3.46
122	5.28	272	4.63	746	3.29
129	5.28	276	4.52		



OFFSHORE OCEANOGRAPHY

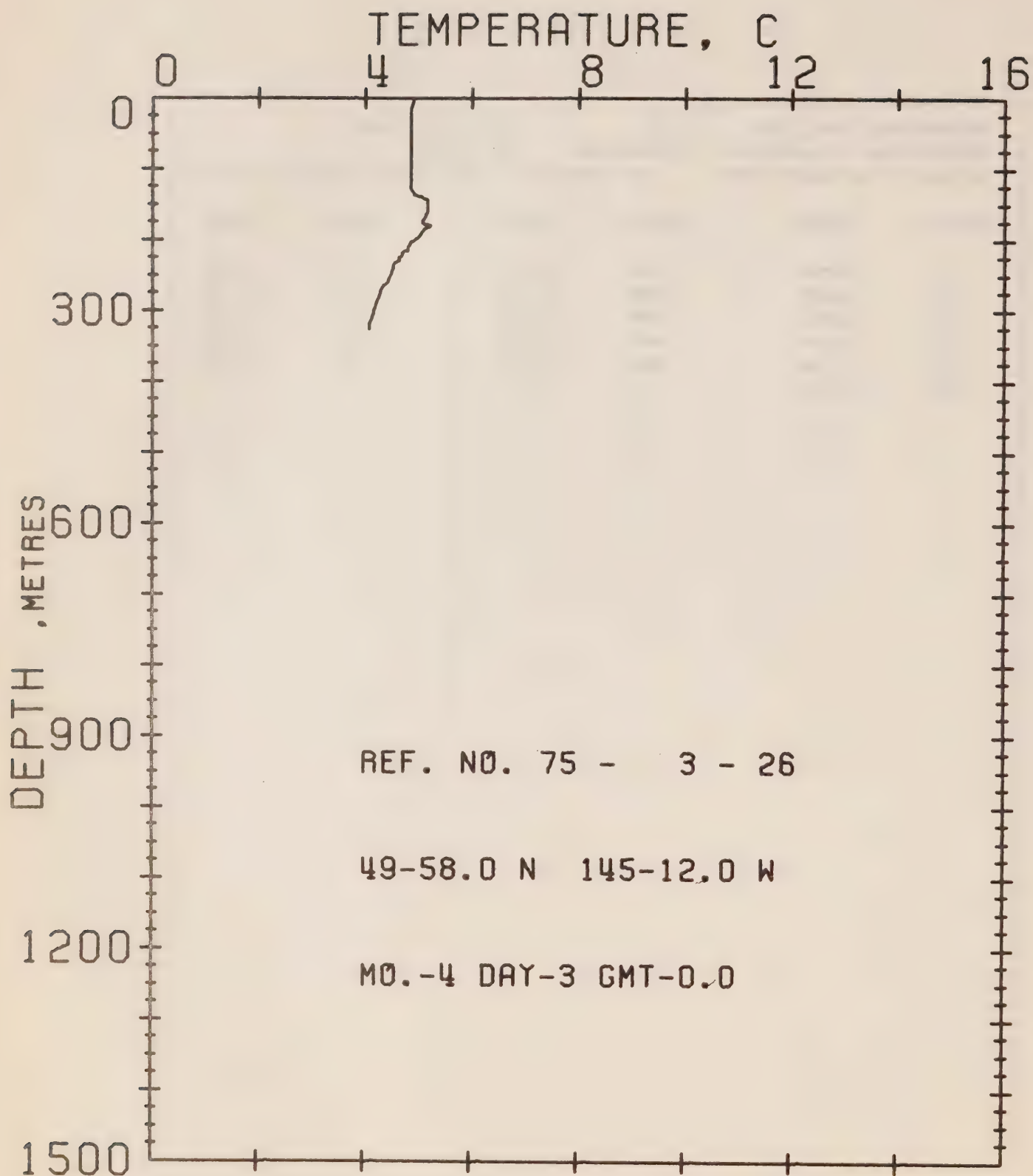
REFERENCE NO. 75- 3- 18

DATE 31/ 3/75

POSITION 49-49.0N 142-40.0W GMT 04.5

RESULTS OF XBT CAST 16 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.50	122	5.45	166	5.39
16	5.45	125	5.39	171	5.39
46	5.45	135	5.39	179	5.28
81	5.34	142	5.50	187	5.18
102	5.34	150	5.45	190	5.18
113	5.28				



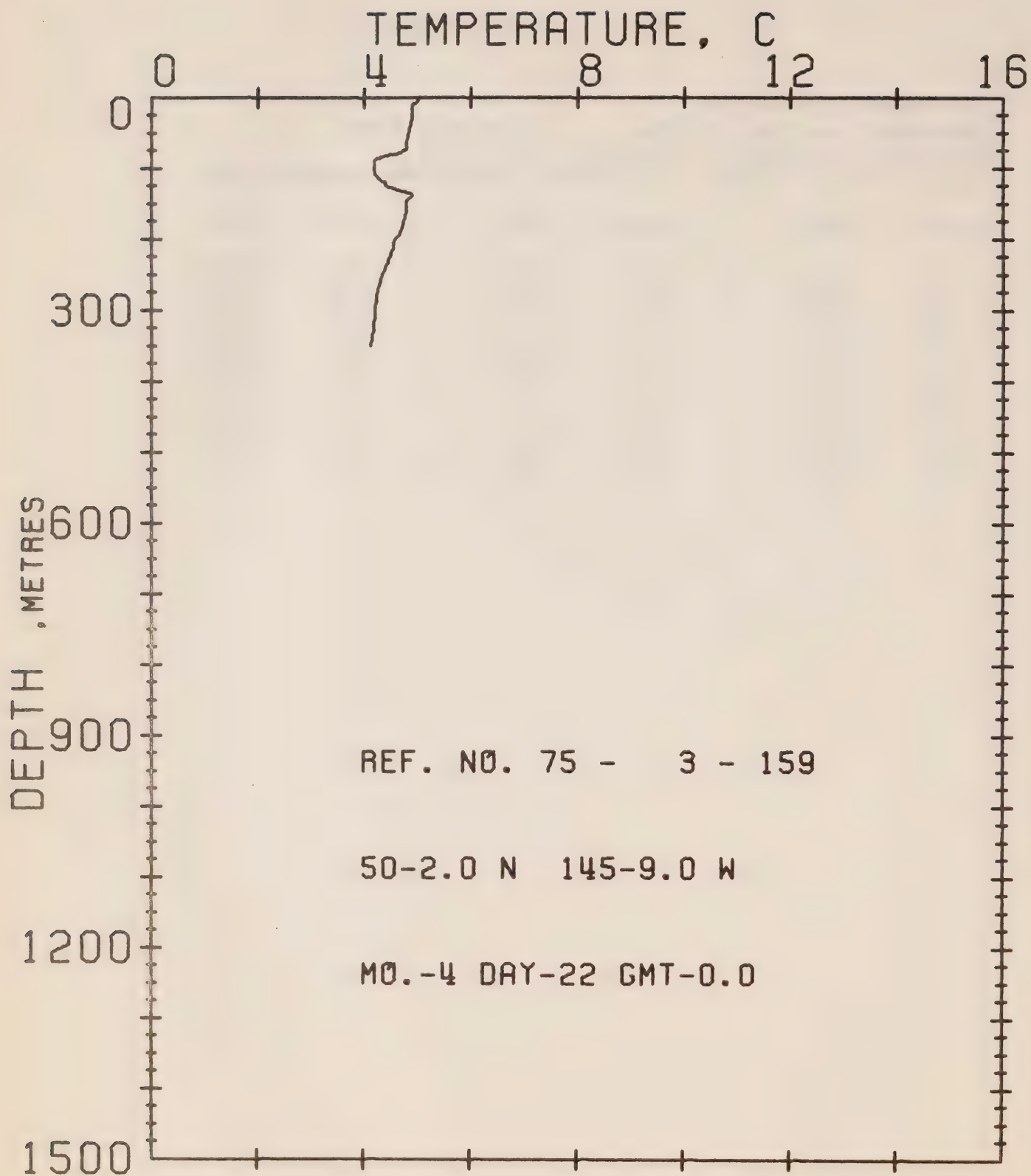
OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 3- 26 DATE 03/ 4/75

POSITION 49-58.0N 145-12.0W GMT 00.0

RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	4.90	169	5.12	230	4.63
17	4.85	175	5.07	232	4.57
52	4.85	179	5.23	248	4.52
88	4.85	183	5.12	261	4.41
114	4.85	195	5.01	264	4.35
125	4.85	205	4.85	295	4.18
136	4.90	215	4.79	313	4.13
139	5.07	217	4.68	318	4.07
144	5.18	223	4.68	325	4.07
160	5.18	224	4.63		



OFFSHORE OCEANOGRAPHY

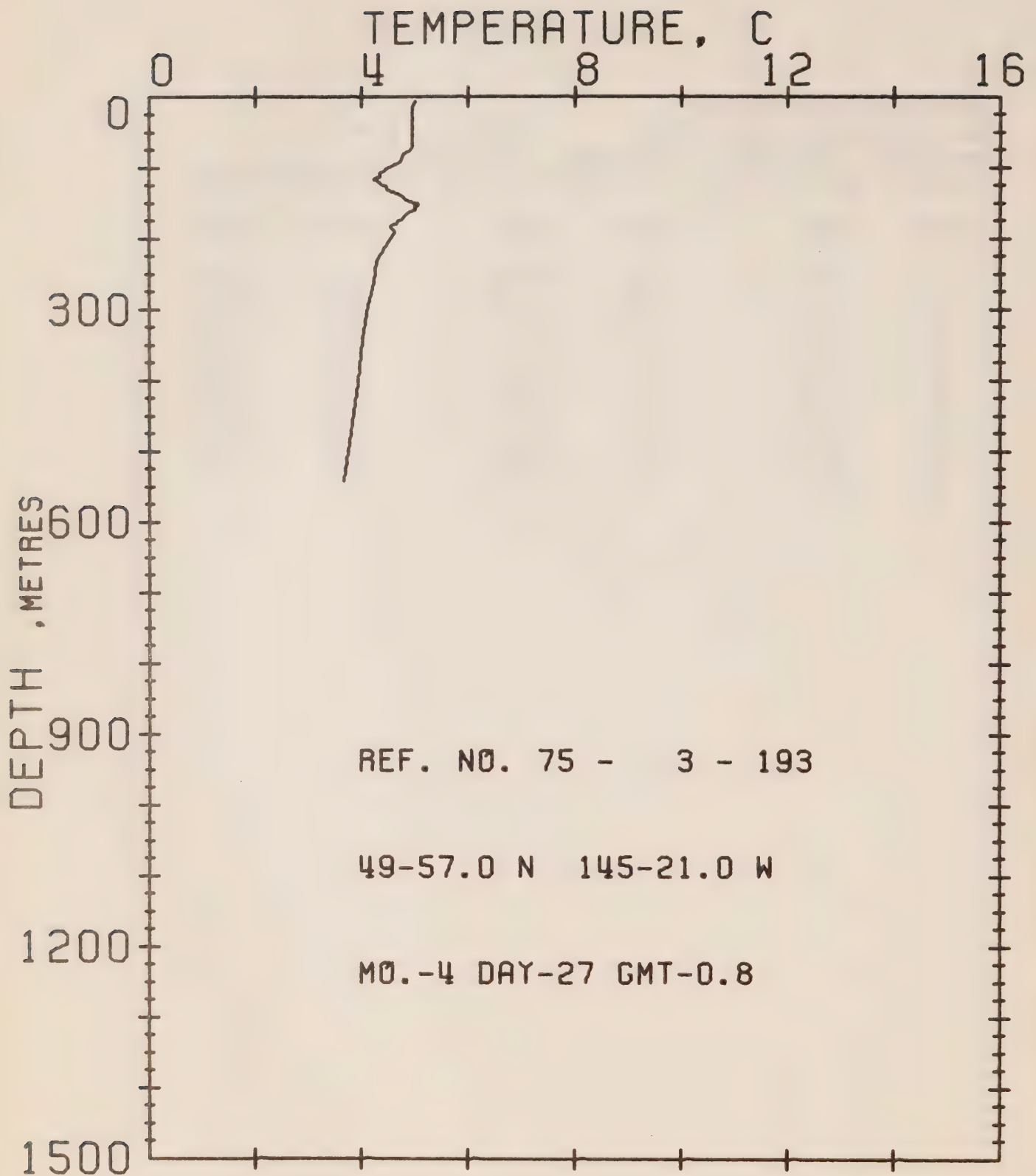
REFERENCE NO. 75- 3-159

DATE 22/ 4/75

POSITION 50-02.0N 145-09.0W GMT 00.0

RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.01	99	4.18	160	4.79
10	4.90	106	4.18	177	4.74
27	4.90	112	4.24	189	4.68
46	4.85	119	4.41	203	4.57
64	4.79	123	4.41	211	4.57
72	4.79	126	4.52	251	4.35
74	4.74	130	4.63	281	4.24
77	4.68	133	4.85	327	4.18
81	4.41	139	4.90	350	4.13
88	4.18	145	4.79		



OFFSHORE OCEANOGRAPHY

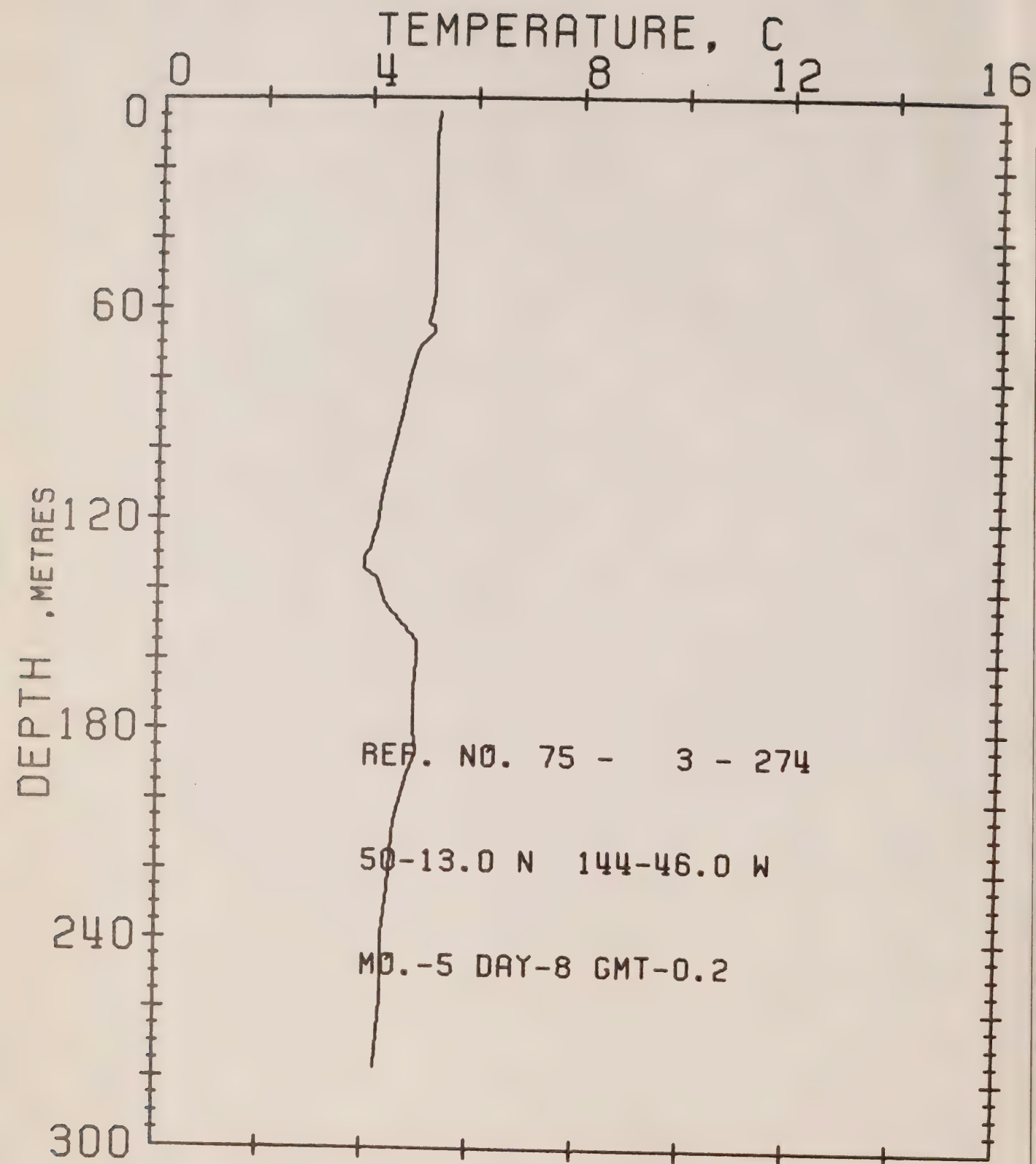
REFERENCE NO. 75- 3-193

DATE 27/ 4/75

POSITION 49-57.0N 145-21.0W GMT 00.8

RESULTS OF XBT CAST 37 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	5.01	121	4.35	176	4.68
7	5.01	125	4.46	183	4.57
14	4.96	132	4.52	192	4.63
37	4.96	137	4.74	199	4.57
58	4.96	143	4.79	212	4.46
71	4.96	148	4.90	233	4.30
76	4.90	151	5.07	265	4.24
80	4.79	153	5.07	293	4.13
91	4.74	154	5.01	343	4.02
100	4.52	160	5.01	403	3.96
108	4.35	163	4.90	460	3.85
112	4.35	170	4.79	541	3.68
117	4.24				



OFFSHORE OCEANOGRAPHY

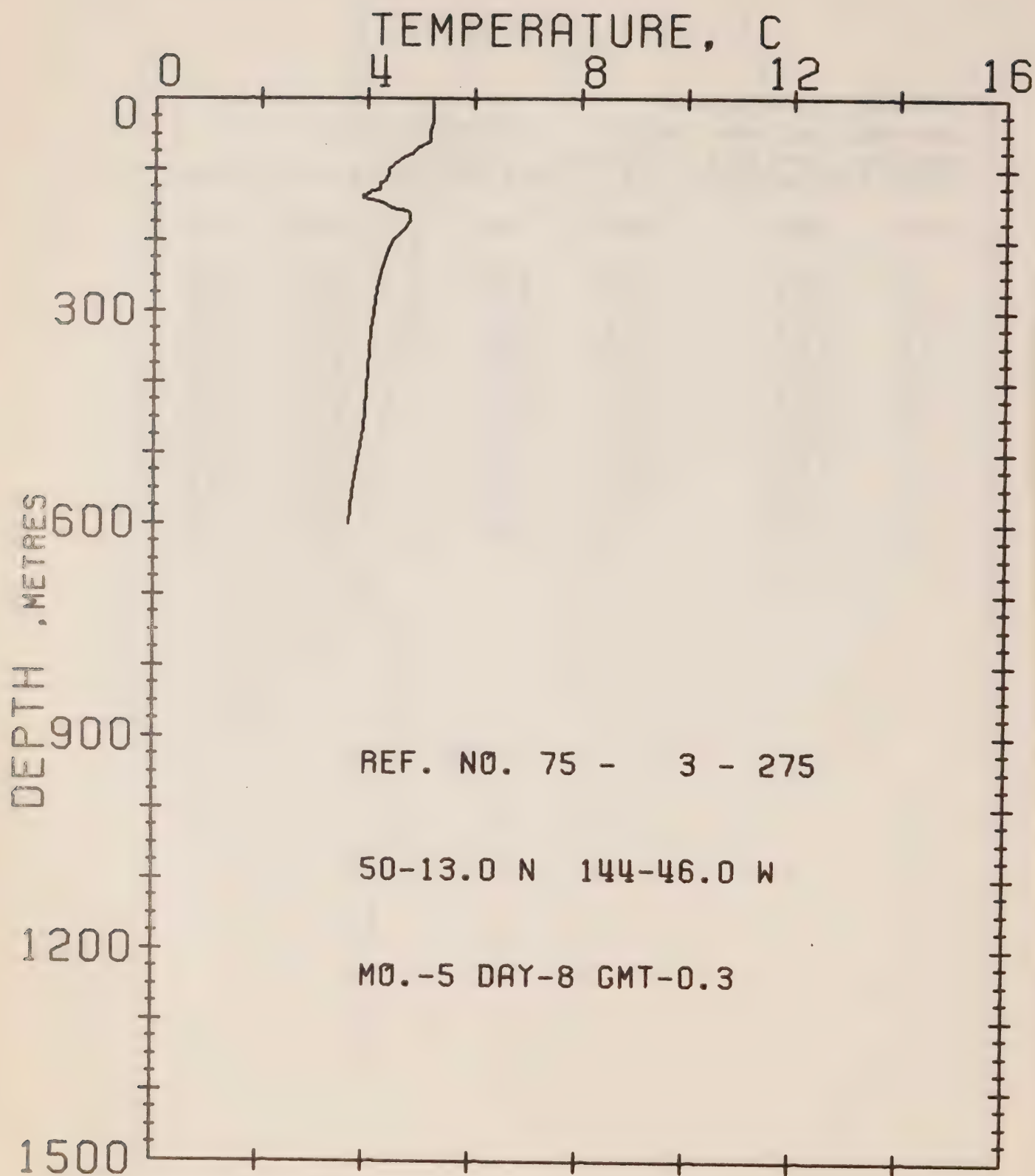
REFERENCE NO. 75- 3-274

DATE 08/ 5/75

POSITION 50-13.0N 144-46.0W GMT 00.2

RESULTS OF XBT CAST 36 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	5.28	90	4.63	150	4.68
12	5.23	99	4.52	155	4.96
30	5.23	108	4.35	160	4.96
47	5.23	116	4.24	169	4.90
56	5.23	123	4.18	180	4.90
61	5.18	124	4.13	187	4.96
64	5.12	128	4.07	193	4.79
65	5.23	131	3.96	206	4.57
67	5.23	134	3.96	225	4.46
71	4.96	137	4.18	239	4.35
73	4.90	144	4.35	257	4.35
78	4.79	146	4.46	277	4.24



OFFSHORE OCEANOGRAPHY

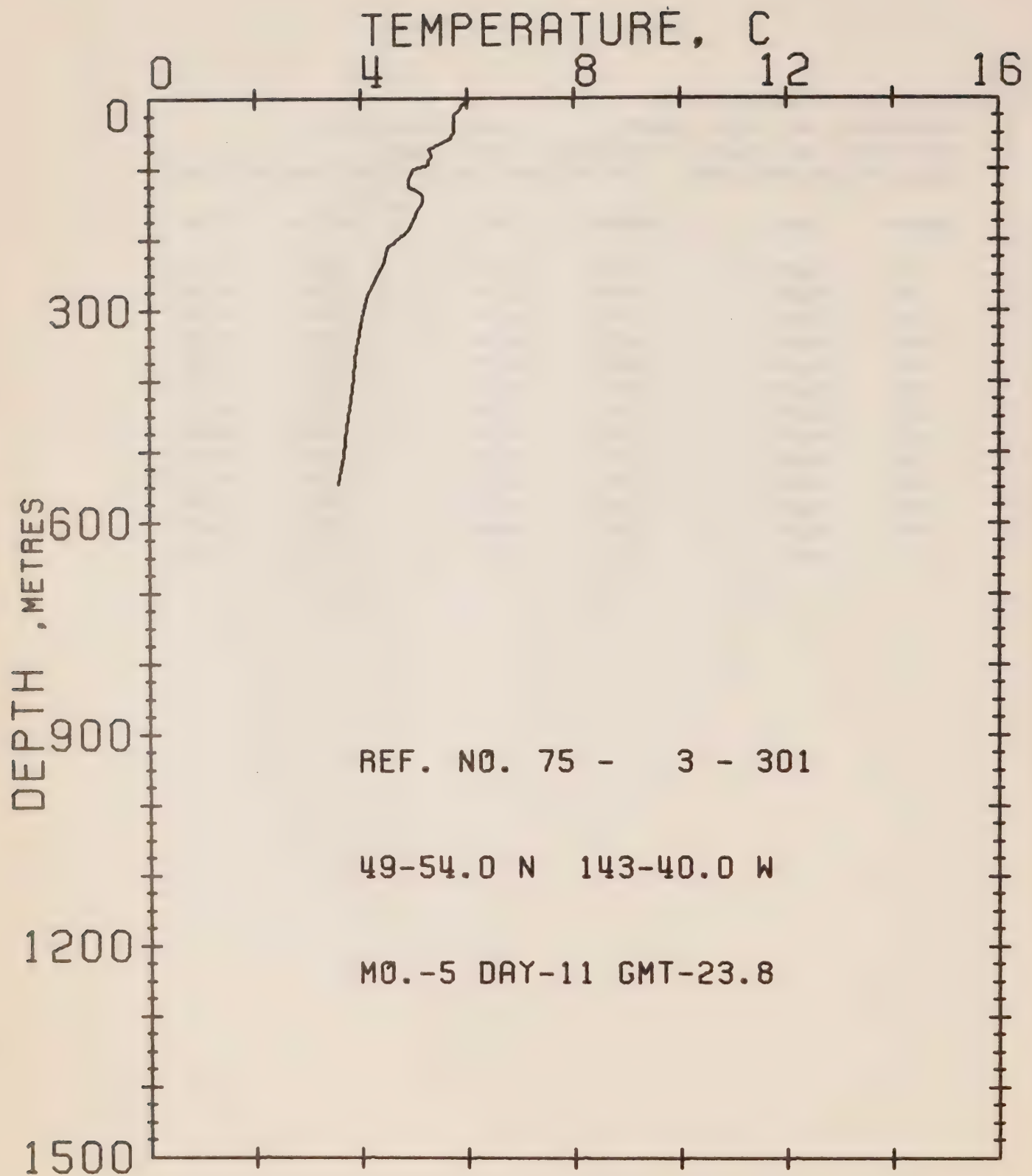
REFERENCE NO. 75- 3-275

DATE 08/ 5/75

POSITION 50-13.0N 144-46.0W GMT 00.3

RESULTS OF XBT CAST 39 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	5.23	115	4.35	162	4.79
9	5.23	118	4.24	174	4.79
34	5.23	123	4.24	183	4.68
46	5.18	127	4.24	197	4.52
53	5.18	129	4.07	215	4.41
59	5.18	133	4.02	237	4.30
63	5.07	135	3.91	271	4.18
67	4.96	138	3.91	302	4.13
75	4.85	140	3.91	328	4.07
82	4.68	143	4.07	384	4.02
92	4.52	147	4.30	465	3.96
99	4.41	153	4.46	556	3.74
107	4.41	157	4.74	599	3.68



OFFSHORE OCEANOGRAPHY

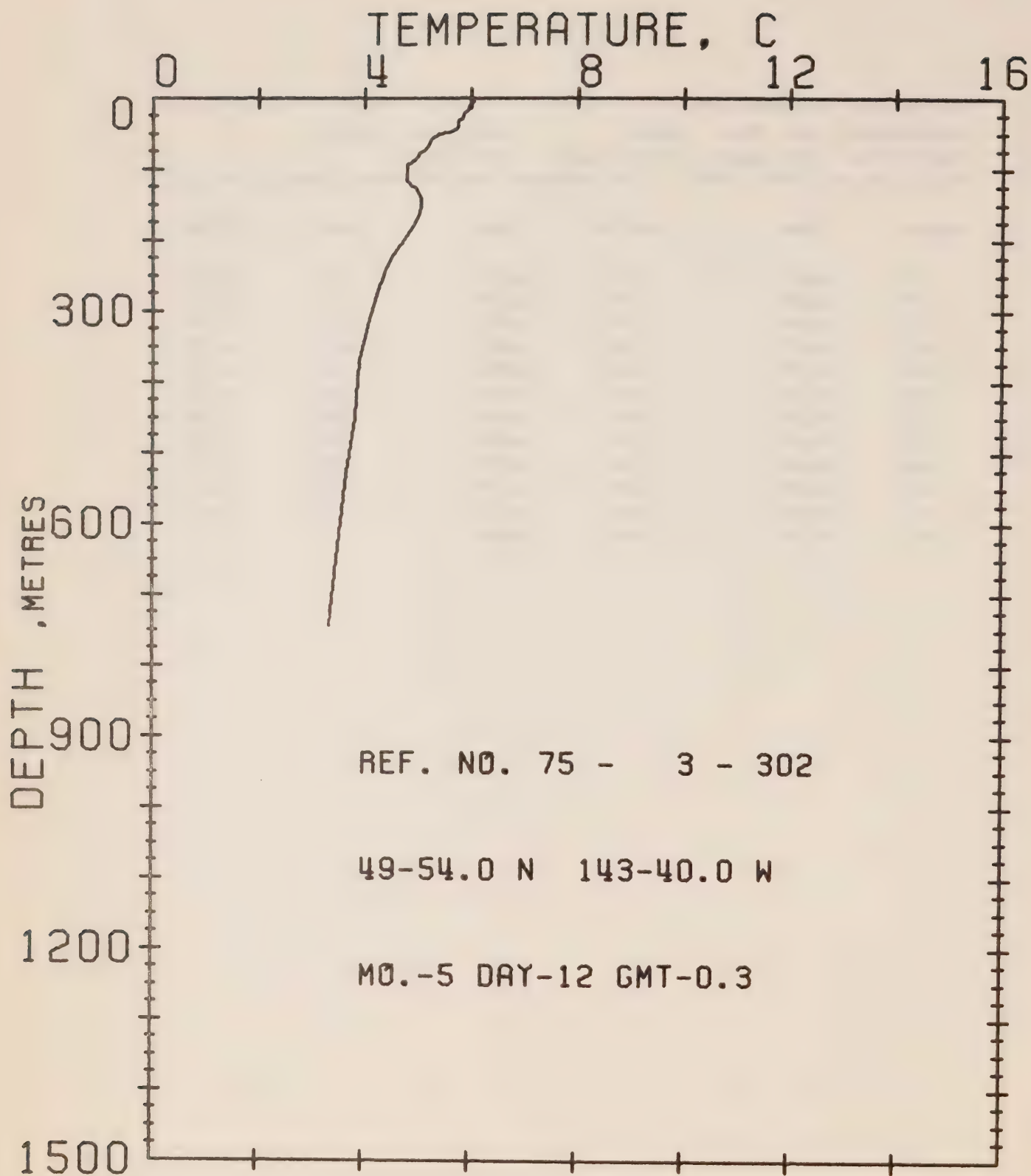
REFERENCE NO. 75- 3-301

DATE 11/ 5/75

POSITION 49-54.0N 143-40.0W GMT 23.8

RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	6.05	87	5.28	199	4.68
7	5.94	94	5.28	211	4.52
16	5.88	99	5.01	231	4.46
23	5.77	106	4.96	257	4.30
34	5.77	115	4.90	281	4.13
43	5.77	123	4.90	312	4.02
50	5.77	129	5.07	354	3.91
58	5.67	138	5.18	412	3.85
66	5.45	148	5.18	466	3.74
71	5.28	160	5.07	505	3.68
77	5.34	172	5.01	545	3.57
83	5.34	186	4.90		



OFFSHORE OCEANOGRAPHY

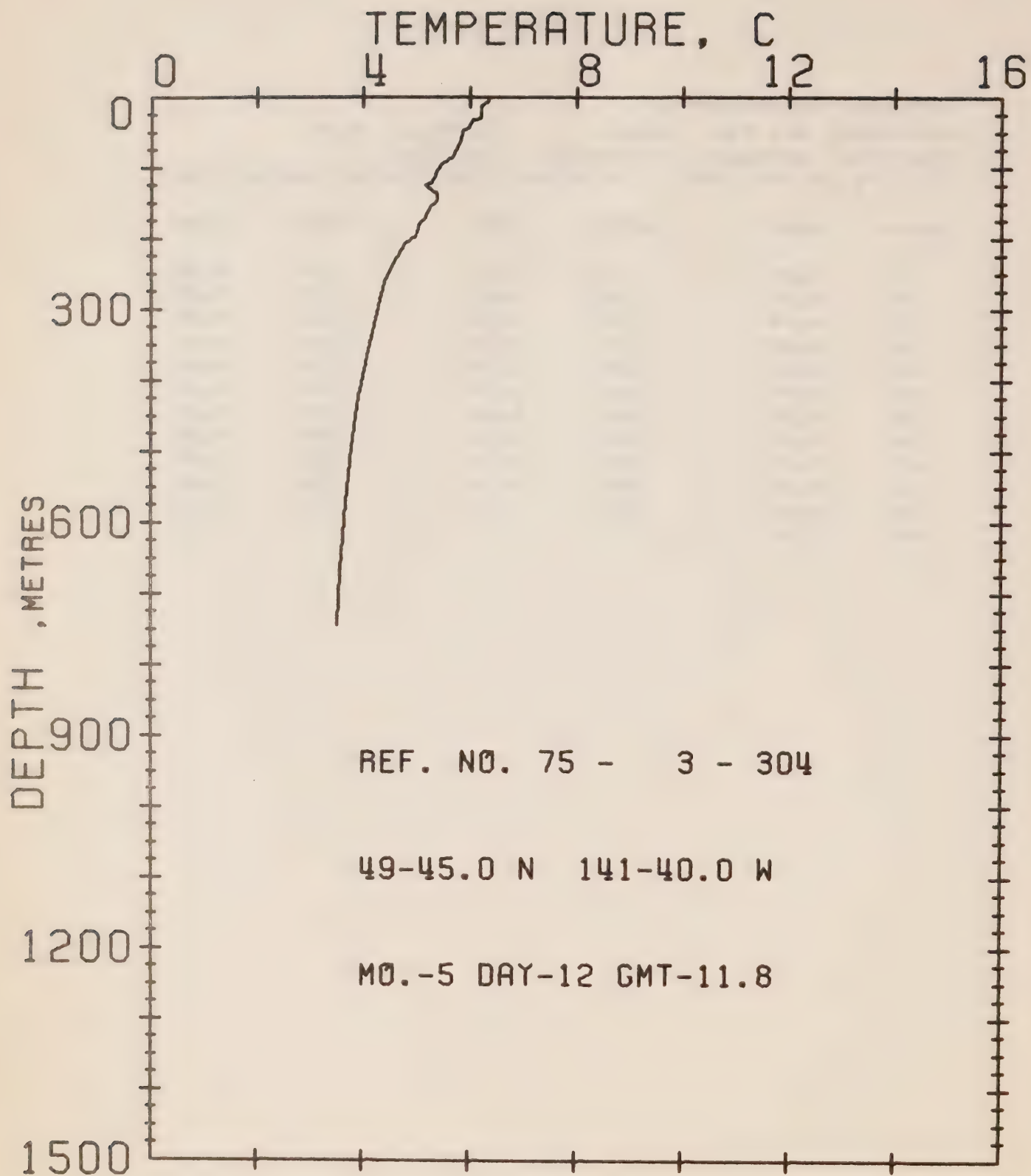
REFERENCE NO. 75- 3-302

DATE 12/ 5/75

POSITION 49-54.0N 143-40.0W GMT 00.3

RESULTS OF XBT CAST 34 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.05	70	5.18	181	4.90
7	5.99	75	5.07	200	4.74
16	5.94	85	4.96	221	4.57
22	5.88	93	4.79	244	4.41
28	5.83	104	4.79	278	4.24
32	5.77	115	4.79	320	4.07
39	5.77	120	4.85	369	3.91
44	5.72	125	4.96	450	3.85
47	5.56	141	5.07	528	3.68
50	5.39	155	5.07	632	3.52
55	5.28	168	5.01	744	3.35
63	5.23				



OFFSHORE OCEANOGRAPHY

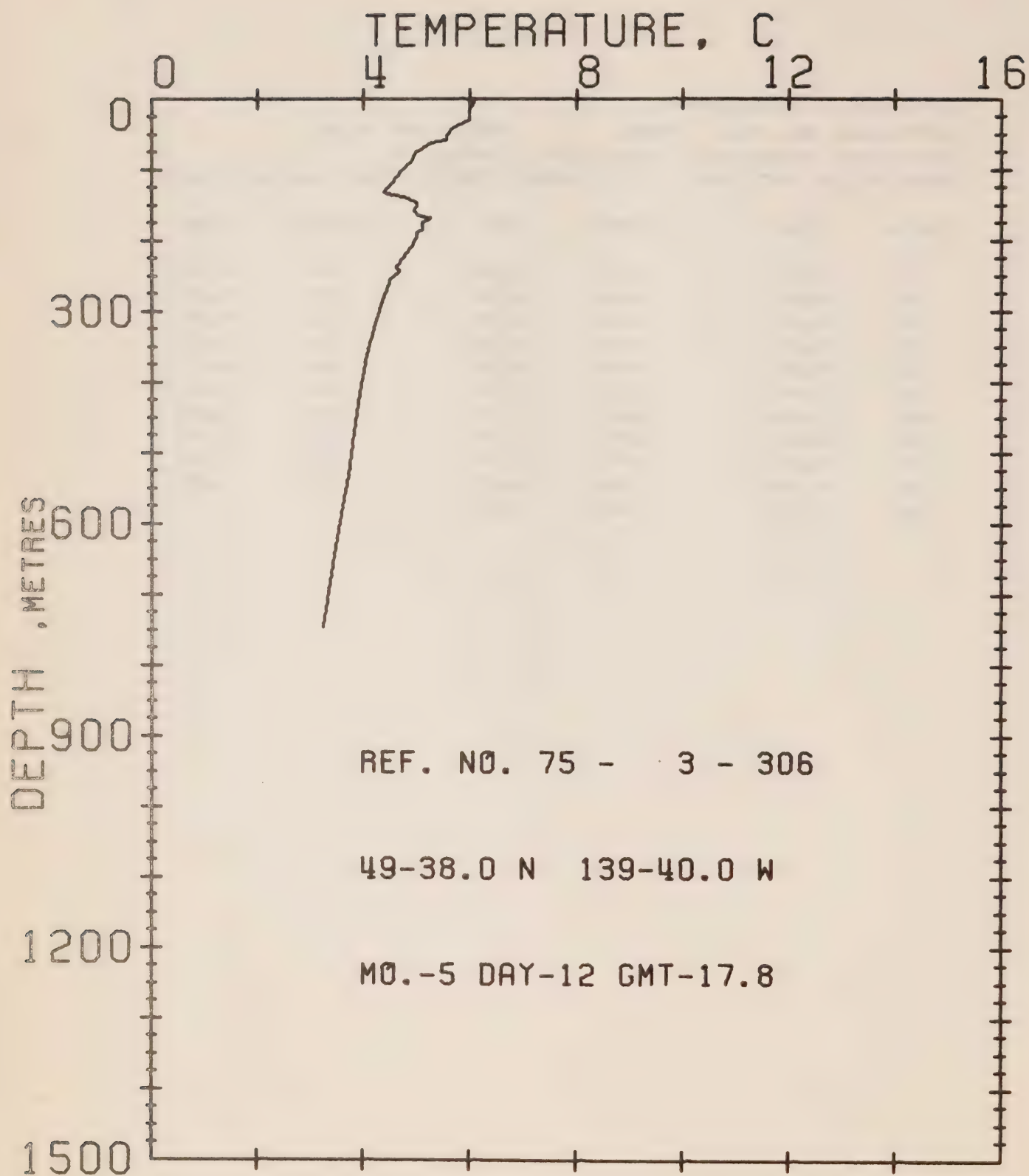
REFERENCE NO. 75- 3-304

DATE 12/ 5/75

POSITION 49-45.0N 141-40.0W GMT 11.8

RESULTS OF XBT CAST 32 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.37	105	5.39	206	4.79
9	6.26	116	5.34	226	4.63
13	6.21	120	5.28	262	4.41
30	6.21	123	5.18	296	4.30
32	6.05	129	5.28	349	4.13
41	5.99	136	5.39	422	3.91
48	5.88	146	5.39	493	3.80
61	5.83	154	5.28	571	3.68
74	5.77	170	5.18	668	3.57
84	5.67	178	5.07	744	3.52
94	5.50	194	5.01		



OFFSHORE OCEANOGRAPHY

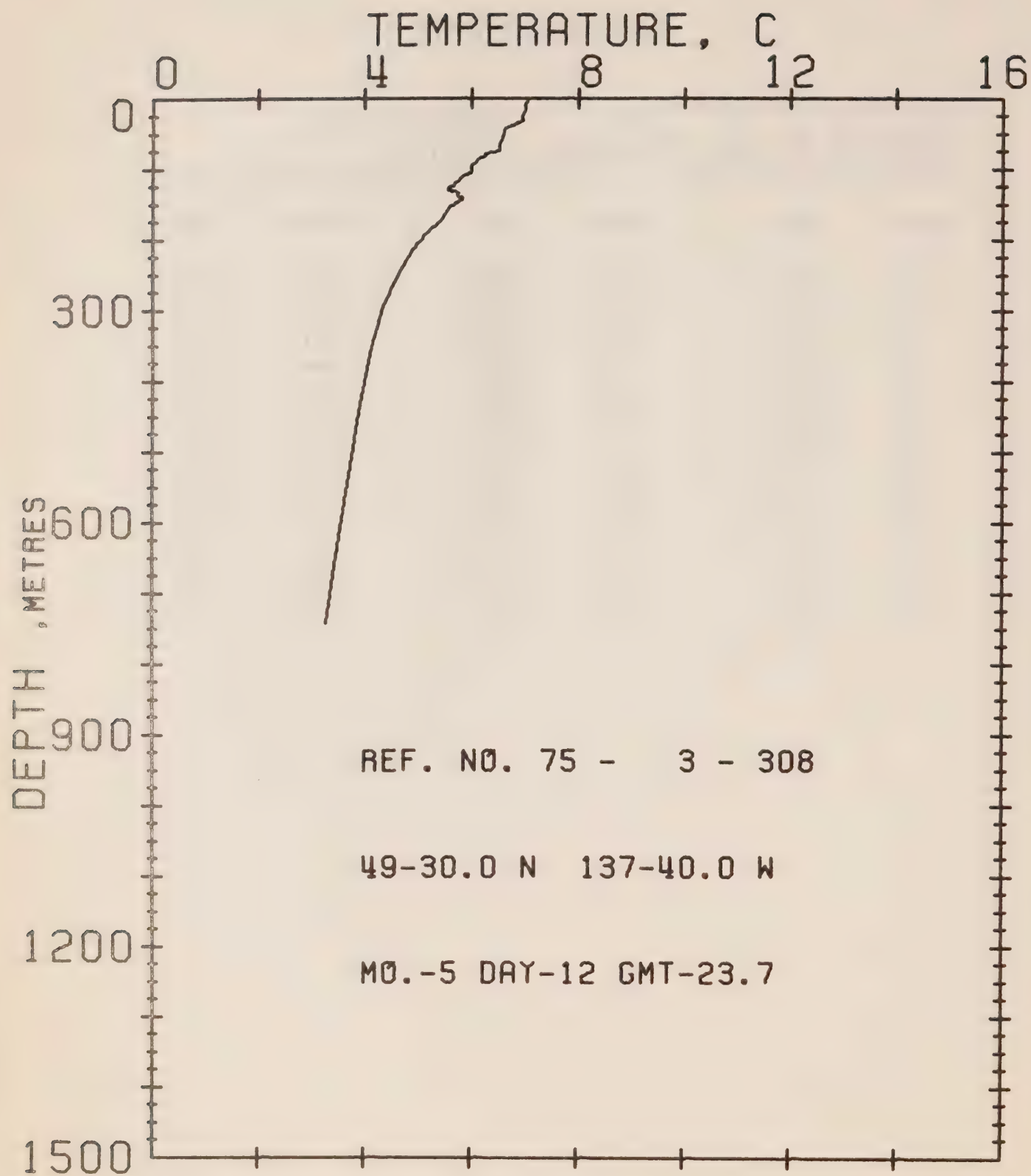
REFERENCE NO. 75- 3-306

DATE 12/ 5/75

POSITION 49-38.0N 139-40.0W GMT 17.8

RESULTS OF XBT CAST 48 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.10	118	4.57	209	4.90
14	5.99	126	4.46	226	4.74
24	5.99	131	4.41	236	4.63
30	5.99	135	4.57	241	4.63
37	5.77	138	4.79	244	4.68
41	5.67	141	4.90	251	4.57
49	5.61	145	5.01	256	4.52
54	5.56	152	5.01	260	4.52
57	5.56	158	4.96	280	4.41
60	5.39	162	5.01	317	4.24
64	5.23	165	5.12	362	4.07
70	5.12	168	5.28	415	3.96
74	5.01	173	5.12	471	3.85
87	4.90	183	5.12	532	3.74
96	4.79	187	5.01	620	3.52
103	4.68	196	5.01	745	3.24



OFFSHORE OCEANOGRAPHY

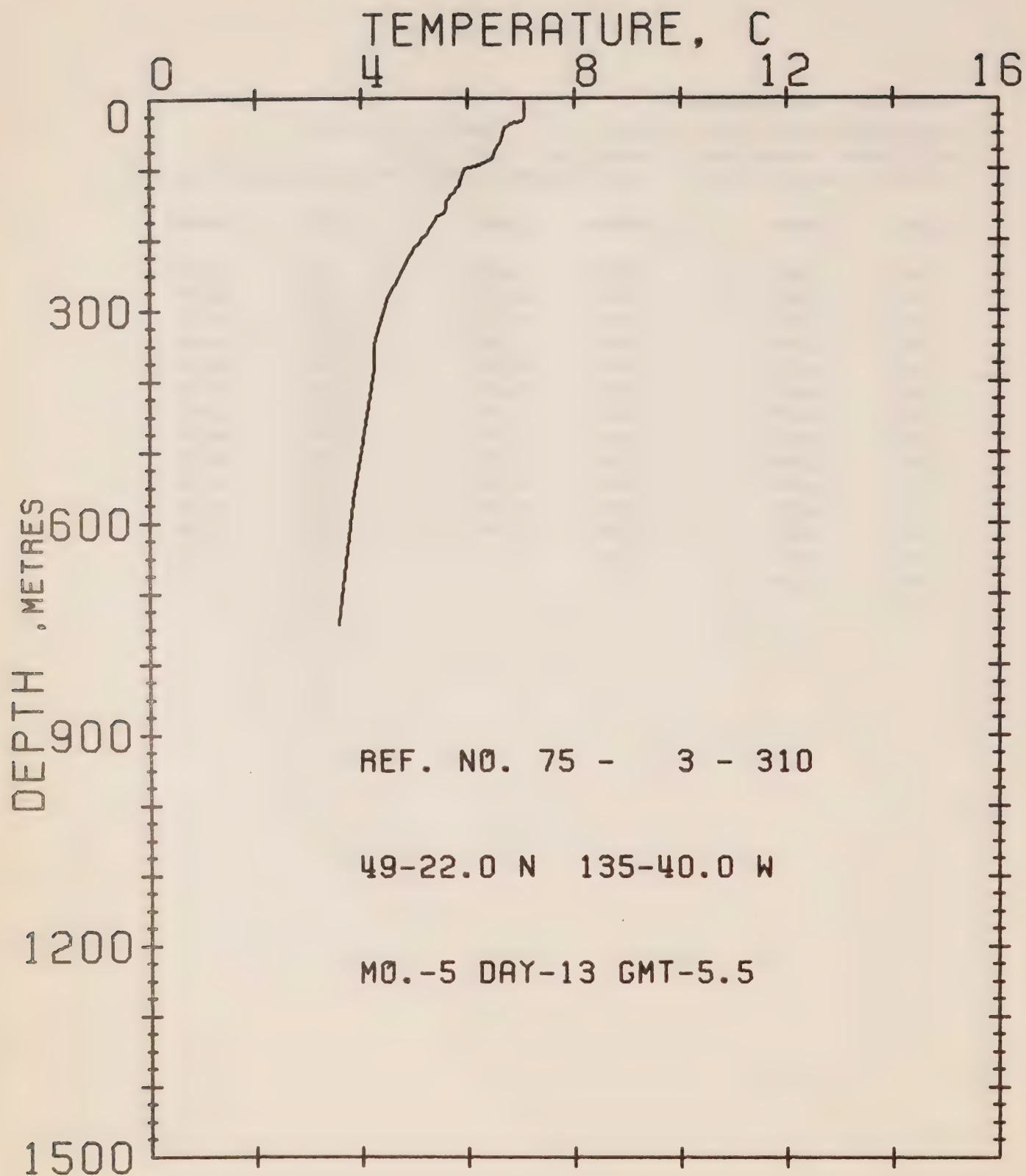
REFERENCE NO. 75- 3-308

DATE 12/ 5/75

POSITION 49-30.0N 137-40.0W GMT 23.7

RESULTS OF XBT CAST 40 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.07	81	6.26	142	5.83
8	7.01	83	6.15	146	5.77
18	7.01	91	6.05	153	5.61
26	6.96	95	5.99	172	5.45
31	6.96	100	5.99	190	5.18
33	6.85	105	5.99	214	4.90
36	6.85	110	5.83	248	4.63
38	6.75	115	5.77	296	4.35
42	6.64	120	5.72	351	4.13
57	6.59	125	5.61	432	3.91
63	6.53	129	5.56	519	3.74
69	6.53	134	5.77	620	3.52
73	6.53	138	5.77	742	3.29
78	6.26				



OFFSHORE OCEANOGRAPHY

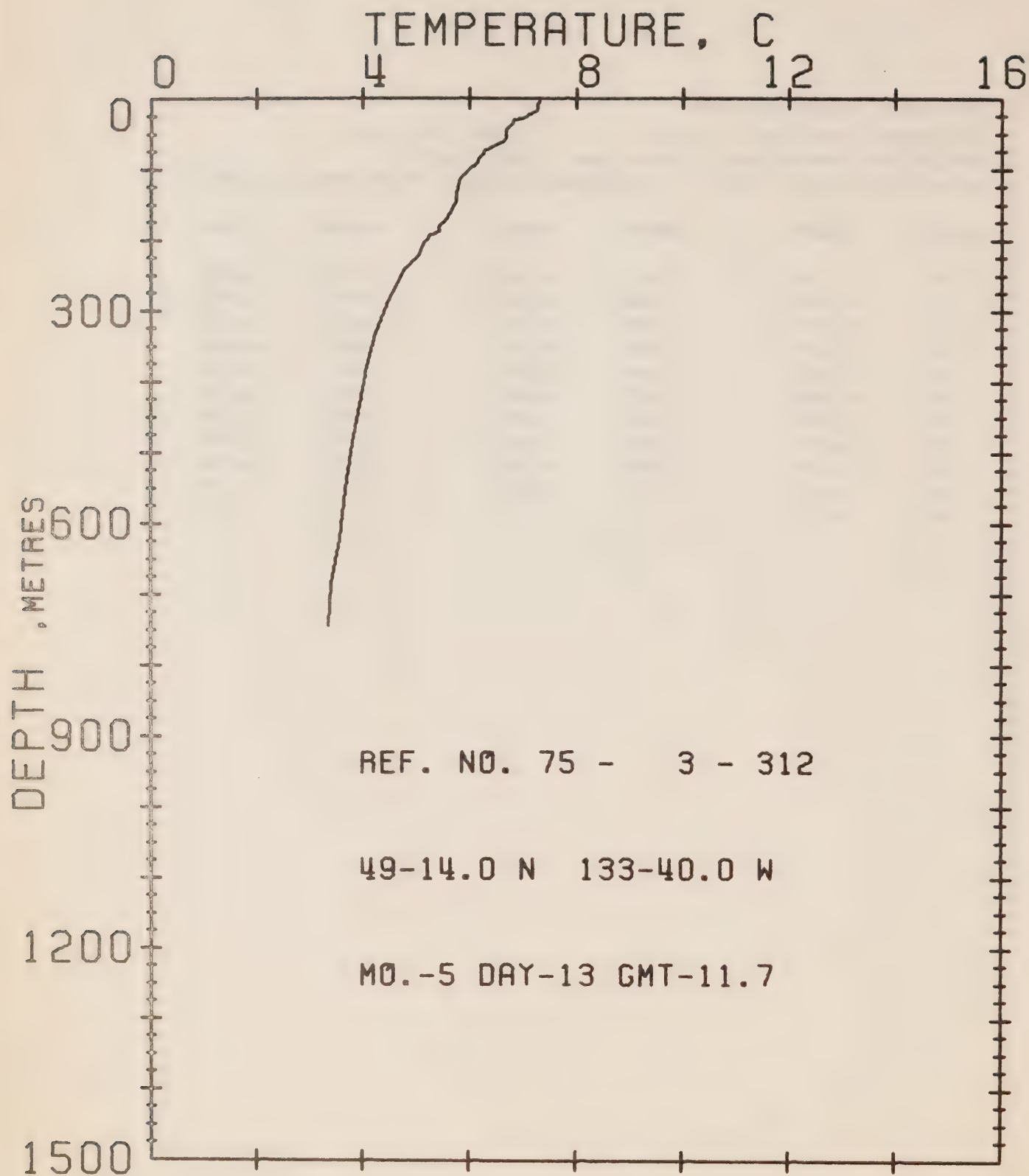
REFERENCE NO. 75- 3-310

DATE 13/ 5/75

POSITION 49-22.0N 135-40.0W GMT 05.5

RESULTS OF XBT CAST 31 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.07	101	5.94	257	4.68
9	7.07	123	5.83	281	4.52
21	7.07	135	5.72	307	4.41
27	7.07	145	5.61	348	4.24
31	7.01	156	5.61	382	4.24
36	6.80	163	5.56	433	4.13
41	6.69	167	5.45	483	4.02
59	6.64	192	5.23	570	3.85
72	6.53	209	5.01	637	3.74
83	6.48	231	4.85	743	3.57
94	6.21				



OFFSHORE OCEANOGRAPHY

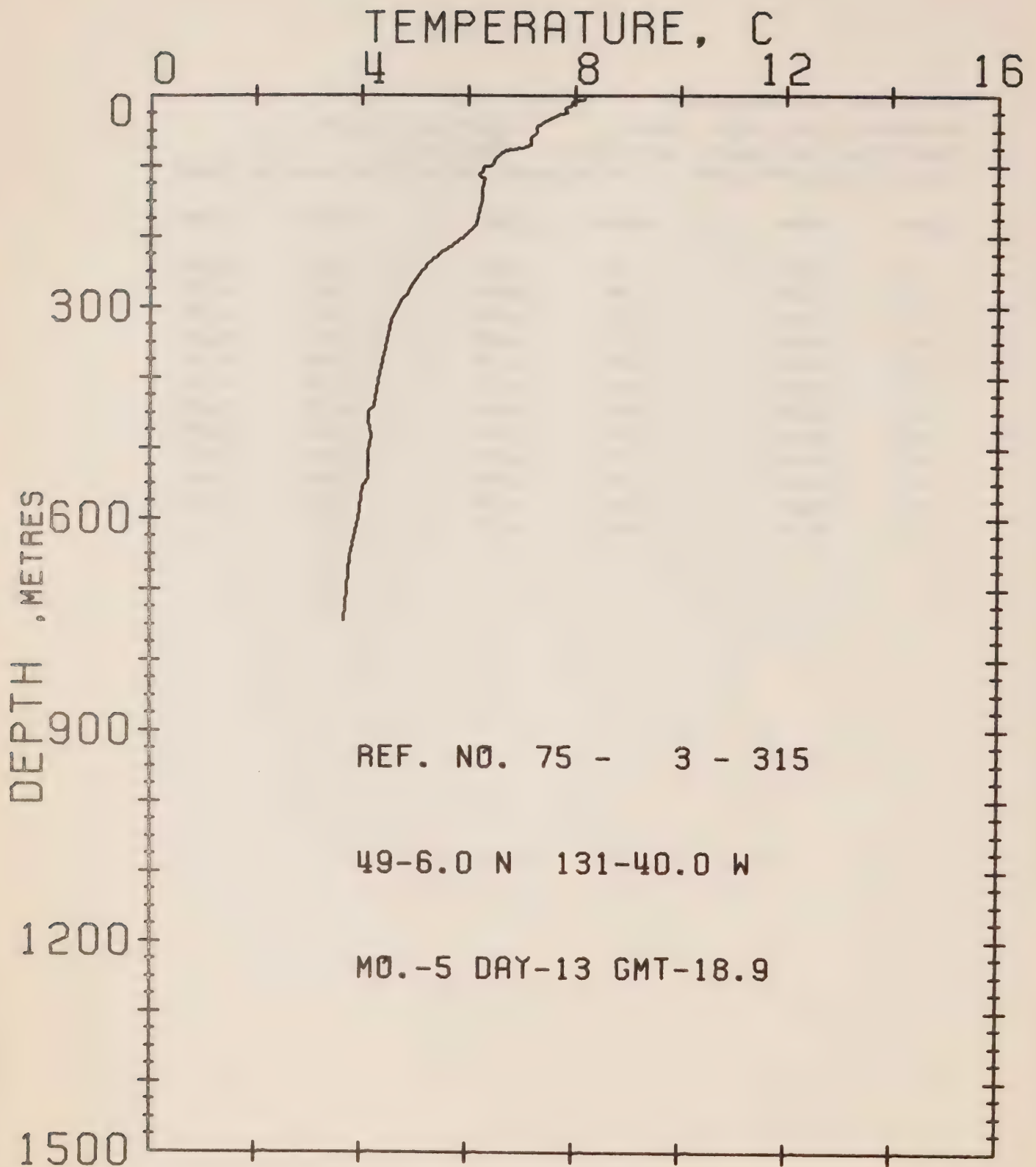
REFERENCE NO. 75- 3-312

DATE 13/ 5/75

POSITION 49-14.0N 133-40.0W GMT 11.7

RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.34	82	6.21	221	5.07
8	7.28	90	6.15	241	4.79
16	7.28	100	5.99	282	4.52
21	7.12	111	5.83	333	4.24
25	7.07	134	5.77	378	4.07
30	6.85	146	5.77	432	3.96
35	6.80	159	5.67	497	3.80
44	6.69	170	5.56	551	3.68
55	6.69	179	5.45	621	3.57
60	6.64	187	5.45	684	3.41
67	6.42	192	5.28	744	3.35
71	6.32	208	5.12		



OFFSHORE OCEANOGRAPHY

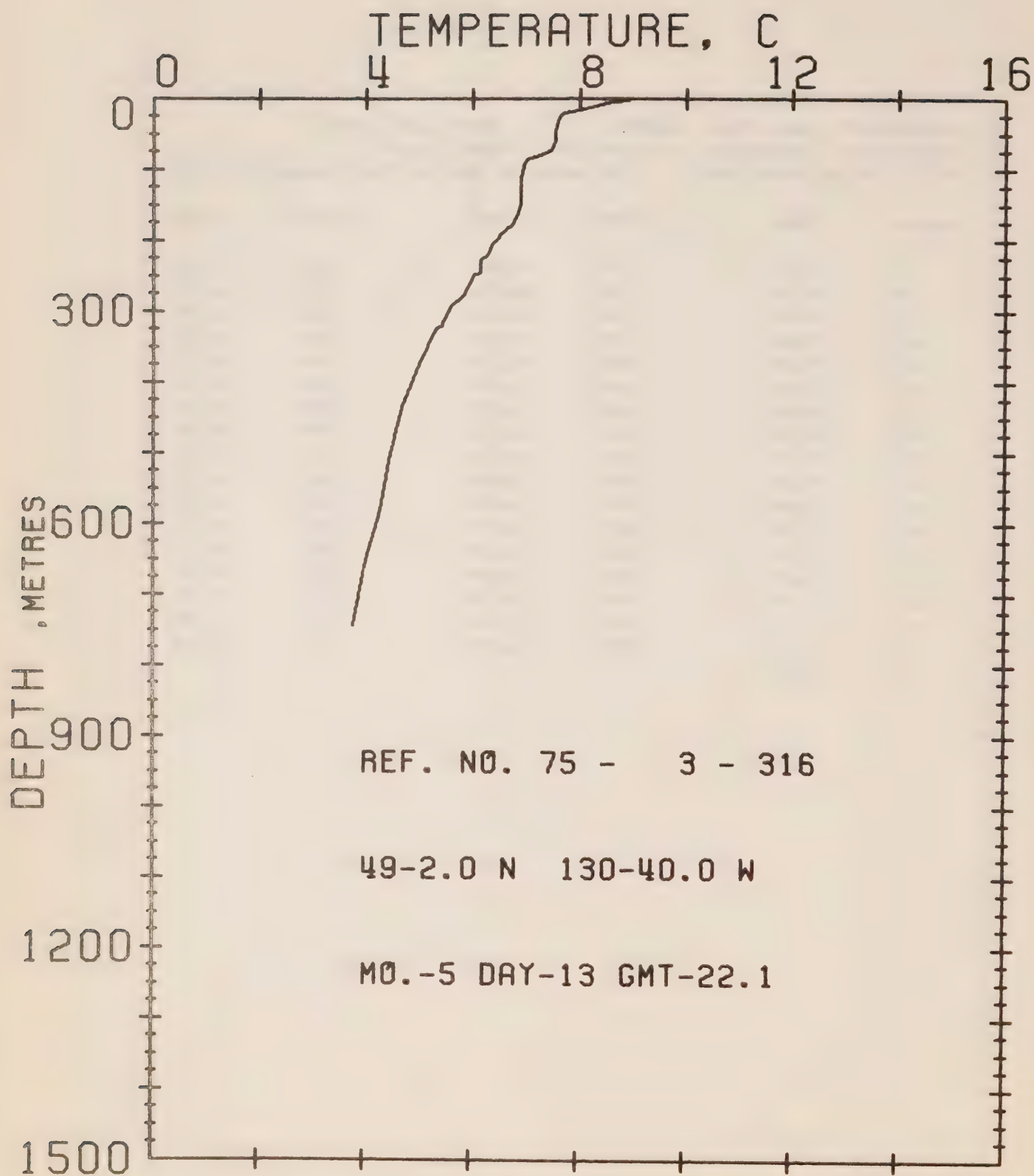
REFERENCE NO. 75- 3-315

DATE 13/ 5/75

POSITION 49-06.0N 131-40.0W GMT 18.9

RESULTS OF XBT CAST 52 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	8.19	79	6.64	250	5.12
6	8.13	87	6.53	268	4.96
8	7.97	95	6.48	283	4.85
14	7.92	99	6.42	291	4.74
16	7.87	101	6.32	319	4.57
19	7.81	108	6.26	358	4.46
23	7.87	112	6.21	393	4.35
26	7.71	118	6.32	440	4.24
31	7.55	131	6.26	447	4.13
34	7.50	141	6.26	461	4.13
37	7.39	151	6.26	482	4.18
43	7.28	161	6.21	507	4.13
51	7.28	181	6.15	543	4.13
60	7.18	197	5.94	553	4.02
67	7.18	211	5.72	600	3.96
70	7.18	222	5.50	653	3.80
73	7.01	235	5.28	743	3.68
75	6.80				



OFFSHORE OCEANOGRAPHY

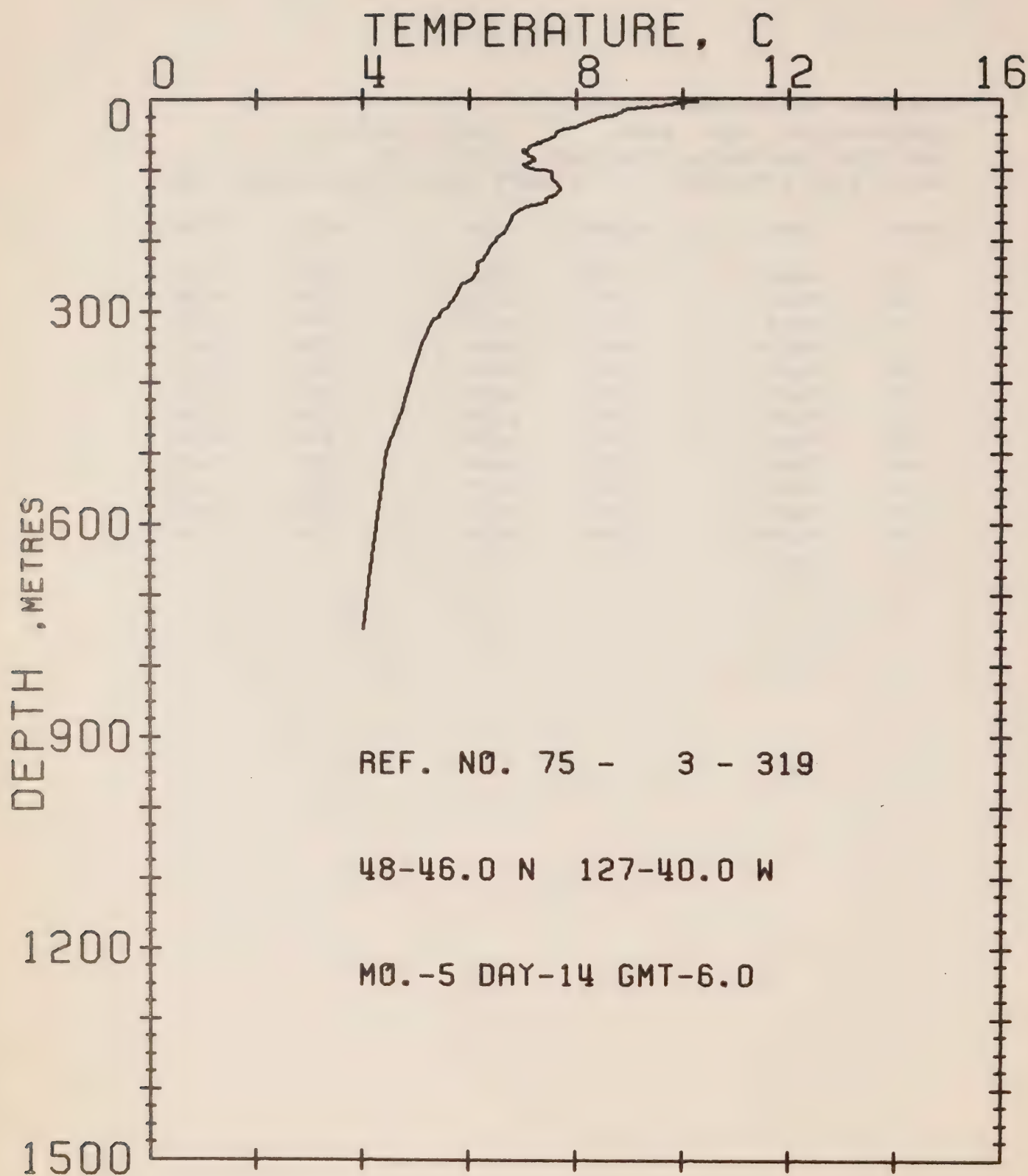
REFERENCE NO. 75- 3-316

DATE 13/ 5/75

POSITION 49-02.0N 130-40.0W GMT 22.1

RESULTS OF XBT CAST 37 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	8.92	85	7.01	245	6.15
4	8.61	95	6.96	248	6.05
7	8.40	114	6.91	276	5.88
12	8.19	130	6.91	294	5.61
16	7.97	150	6.91	321	5.45
18	7.81	162	6.85	324	5.34
21	7.65	172	6.80	376	5.01
32	7.60	177	6.75	435	4.68
46	7.55	183	6.64	511	4.46
60	7.55	206	6.37	582	4.30
69	7.50	217	6.32	652	4.02
75	7.39	228	6.15	744	3.80
81	7.18				



OFFSHORE OCEANOGRAPHY

REFERENCE NO. 75- 3-319

DATE 14/ 5/75

POSITION 48-46.0N 127-40.0W GMT 06.0

RESULTS OF XBT CAST 61 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	10.28	86	7.23	207	6.42
4	10.18	89	7.12	220	6.32
7	9.71	91	7.01	225	6.26
9	9.60	96	7.07	231	6.15
11	9.24	99	7.28	243	6.15
14	8.98	100	7.44	255	6.05
17	8.87	102	7.55	262	5.88
21	8.77	107	7.55	278	5.77
26	8.45	111	7.55	285	5.67
31	8.24	119	7.65	294	5.61
36	8.08	127	7.71	298	5.50
40	7.97	135	7.60	308	5.45
41	7.76	140	7.44	310	5.34
46	7.65	145	7.44	346	5.12
52	7.60	152	7.07	383	4.96
57	7.44	158	6.91	439	4.74
63	7.23	165	6.80	498	4.46
67	7.12	171	6.80	559	4.35
73	7.01	185	6.69	646	4.18
76	7.07	191	6.59	748	4.02
82	7.18				

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS

(P-75-3)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 3

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
75	3	28	2333	30.169	8.3	125-33
75	3	29	127	30.586	8.1	126- 0
75	3	29	346	32.374	8.2	126-40
75	3	29	726	32.456	7.6	127-40
75	3	29	1100	32.479	7.2	128-40
75	3	29	1715	32.586	7.2	130-40
75	3	30	18		6.4	132-40
75	3	30	315		5.9	133-40
75	3	30	615		5.8	134-40
75	3	30	920		5.7	135-40
75	3	30	1130		5.9	136-40
75	3	30	1400		5.5	137-40
75	3	30	1655		5.4	138-40
75	3	30	1940		5.4	139-40
75	3	30	2210		5.9	140-40
75	3	31	50		5.7	141-40
75	3	31	430		5.6	142-40
75	3	31	900		5.4	143-40
75	4	1	0	32.696	5.0	ON STATION
75	4	2	0	32.723	4.3	ON STATION
75	4	3	0	32.738	4.5	ON STATION
75	4	4	0	32.738	4.8	ON STATION
75	4	5	0	32.750	4.9	ON STATION
75	4	6	0	32.730	5.0	ON STATION
75	4	7	0	32.737	4.9	ON STATION
75	4	8	0	32.735	5.0	ON STATION
75	4	9	0	32.749	4.8	ON STATION
75	4	10	0	32.695	5.0	ON STATION
75	4	11	0	32.737	5.1	ON STATION
75	4	12	0	32.739	5.0	ON STATION
75	4	13	0	32.737	5.1	ON STATION
75	4	14	0	32.768	5.1	ON STATION
75	4	15	0	32.757	5.2	ON STATION
75	4	16	0	32.733	5.8	ON STATION
75	4	17	0	32.730	5.7	ON STATION
75	4	18	0	32.728	5.2	ON STATION
75	4	19	0	32.738	5.0	ON STATION
75	4	20	0	32.739	5.0	ON STATION
75	4	21	0	32.730	5.1	ON STATION
75	4	22	0	32.745	4.8	ON STATION
75	4	23	0	32.750	4.9	ON STATION
75	4	24	0	32.743	5.1	ON STATION
75	4	25	0	32.748	5.0	ON STATION
75	4	26	0	32.750	5.2	ON STATION

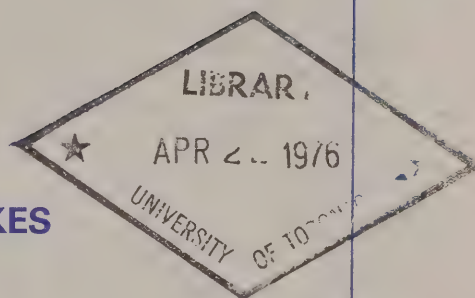
SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 75- 3

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
75	4	27	0	32.754	5.0	ON STATION
75	4	28	0	32.750	5.1	ON STATION
75	4	29	0	32.750	5.1	ON STATION
75	4	30	0	32.751	5.2	ON STATION
75	5	1	0	32.743	5.2	ON STATION
75	5	2	0	32.757	5.0	ON STATION
75	5	3	0	32.744	5.2	ON STATION
75	5	4	0	32.747	5.3	ON STATION
75	5	5	0	32.736	5.5	ON STATION
75	5	6	0	32.741	5.4	ON STATION
75	5	7	0	32.742	5.4	ON STATION
75	5	8	0	32.708	5.4	ON STATION
75	5	9	0	32.730	5.7	ON STATION
75	5	10	0	32.742	6.1	ON STATION
75	5	11	0	32.719	5.5	ON STATION
75	5	11	2345	32.702	6.2	143-40
75	5	12	1430	32.646	6.4	140-40
75	5	12	520	32.708	6.3	142-40
75	5	12	2027	32.639	6.5	138-40
75	5	13	215	32.518	7.0	136-40
75	5	13	815	32.520	7.3	134-40
75	5	13	1500		7.6	132-40
75	5	13	1850		8.3	131-40
75	5	13	2205		10.1	130-40
75	5	14	330	32.425	10.2	128-40
75	5	14	600	32.106	10.4	127-40
75	5	14	840	32.094	10.3	126-40
75	5	14	1115	31.922	10.7	126- 0

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**AQUATIC OLIGOCHAETA
RECORDED FROM CANADA
AND THE ST. LAWRENCE GREAT LAKES**



By

R.O. Brinkhurst

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Victoria, B.C.**



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January 1976

This is a manuscript which has received only limited circulation. On citing this report in a bibliography, the title should be followed by the words "UNPUBLISHED MANUSCRIPT" which is in accordance with accepted bibliographic custom.

INTRODUCTION

In the last decade D. G. Cook and the author have identified aquatic Oligochaeta for many scientists, but have received very few collections from Canada. The Canadian museums do not contain significant collections of aquatic species, and only the Rawson collections of the University of Saskatchewan (made accessible to the author by Dr. U. T. Hammer) and those of the Department of Zoology, University of Toronto (made available by courtesy of Dr. F. P. Ide and the former Great Lakes Institute) appear to have survived from various lake surveys. The Ontario Department of Lands and Forests submitted a collection from Northern Ontario, and the analyses of these three collections were made available, with a key to the Tubificidae, by Brinkhurst et al. 1968. Earlier records were published in the series of studies on American species by Brinkhurst (1964, 1965) and Brinkhurst and Cook (1966). Canadian specimens in American museums were mostly derived from surveys carried out by T. W. Beak, and the collections held by Mr. Beak's consultant agency were purchased for study prior to the publication of those keys. Benthic studies in the St. Lawrence Great Lakes were reviewed by Cook and Johnson (1974) and the species reported below as having been recorded in that water system may be traced via the bibliography in that review.

Dr. D. G. Cook identified the specimens collected in the Yukon and Northwest Territories in the course of the Mackenzie pipeline studies (Wiens et al. 1975) and published an account of material collected in Lake Superior (Cook and Hiltunen 1975). He also identified a collection from Lake Winnipeg for Dr. O. Saether of the Freshwater Institute, Winnipeg. The marine species found on the northeast Atlantic seaboard of the U.S.A. were reviewed by Cook and Brinkhurst (1973) and many of the species found are likely to be present in the Maritime Provinces at least. Marine species will not be included in this account. Unpublished records appearing here for the first time are attributed to the collector in each specific list without date; published records, other than those for the Great Lakes, bear a publication date and are listed in the bibliography. The full synonymies of all species may be found in the review of the world aquatic Oligochaeta by Brinkhurst and Jamieson (1971).

GEOGRAPHICAL RECORDS

Annelida, Class Clitellata

1. Subclass Oligochaeta, Order Lumbriculida

Fam. LUMBRICULIDAE

Gen. *Lumbriculus*

Lumbriculus variegatus (Müller, 1774)

Yukon: Pond in tundra, Herschel Island (Smith and Welch 1919), Old Crow River, Cariboo Bar Creek (Wiens et al. 1975).

Northwest Territories: Cape Bathurst, Barnard Harbour (Smith and Welch 1919), Mackenzie system (Wiens et al. 1975).

British Columbia: Chilcotin, Cariboo, Springhouse (G.G.E. Scudder).

Saskatchewan: Nist Lake, Wollaston Lake, Cree Lake, Mountain Lake, Drinking Lake, Otter Lake, Drope Lake (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: St. Lawrence Great Lakes.

This species is almost certainly widespread and abundant in many more localities than these few records would suggest.

Gen. *Stylodrilus*

Stylodrilus heringianus Claparède, 1862

British Columbia: Okanagan Lake (O. Saether).

Manitoba: Lower Saskatchewan River, 10 miles above Cedar Lake, The Pas (J. A. Cober).

Ontario: Terrace Bay, Lake Superior (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Lake St. John (T. W. Beak).

New Brunswick: N.W. Miramichi River Waterton (C. Wurtz), Glazier Lake, First Green Lake (W. Watt et al. 1973).

Newfoundland: various localities (Pickavance 1971).

These new records dispose of the speculation that this species was introduced to and remained limited to the St. Lawrence Great Lakes, in which it is so abundant (Brinkhurst et al. 1968). There is one other species recorded from North America to be described from the Yukon and Northwest Territories (Wiens et al. 1975).

Gen. *Eclipidrilus*

Eclipidrilus lacustris (Verrill, 1871)
(= *Stylodrilus grangei* Brinkhurst, 1964 - nom. nud.)

Ontario: South shore St. Ignace Island, Lake Superior (U.S. Nat. Mus. 15589, 17947, 32667) - Type locality.

Quebec: Saguenay River, Kenogami (T. W. Beak).

There are four other American species reported from California, Florida, North Carolina, South Carolina, Louisiana, Montana, and Illinois. The genus is unknown outside North America.

Gen. *Kincaidiana*

Kincaidiana hexatheca Altman, 1963

British Columbia: Okanagan Lake, Skaha Lake (O. Saether).

This is a western species, and the second American species was reported from Lake Tahoe, Nevada/California.

Dr. D. G. Cook has discovered three new lumbriculid species (one of them attributable to *Stylodrilus*) in his study of material collected by the Mackenzie Valley pipeline investigations carried out by the Freshwater Institute, Winnipeg (Wiens et al. 1975). These will be described elsewhere. Holmquist (1974a) reported the presence of *Styloscolex opisthothecus* Sokolskaja in northern Alaska, the rest of the genus being found in eastern Asia, most of them in Lake Baikal. The genus *Rhynchelmis* is represented by two American species, *R. elrodi* Smith and Dickey, 1918 being likely to occur in Canada as it has been recorded from Alaska, Washington, Montana, Idaho, Wyoming, with a single record from North Carolina which would seem to require confirmation. The second species, *R. rostrata* (Eisen, 1888), is known from California, Nevada and Wyoming.

The provision of keys to the Lumbriculidae will await the description of the new species obtained by Dr. D. G. Cook, whose studies of this family have also added *Trichodrilus culveri*, *Stylodrilus beattiei*, and *Spelaedrilus multiporus* from caves in West Virginia and Virginia to the recorded U.S. groundwater species *Trichodrilus allobrogum* Claparède, 1862 (Cook 1975).

2. Subclass Oligochaeta, Order Haplotaxida

A. Suborder Haplotaxina

Fam. HAPLOTAXIDAE

Gen. *Haplotaxis*

Haplotaxis gordioides (Hartmann, 1821)

Ontario: ? in a well, Blanchard Twp. Perth Co.
(Ont. Water Res. Comm.).

This species is probably widely distributed, especially in ground water. Mature specimens are scarce, and the status of various American specimens is uncertain (Cook 1975). The second American species *Haplotaxis brinkhursti* Cook, 1975 was found in a cave in West Virginia.

B. Suborder Tubificina

Fam. NAIDIDAE

Gen. *Chaetogaster*

Chaetogaster diaphanus (Gruithuisen, 1828)

Alberta: ? Beaver Lake, Lake La Biche (R. Nursall - Mr. Pinsent).

Chaetogaster crystallinus Vejdovsky, 1883

Northwest Territories: Harris River, Fort Simpson
(Wiens et al. 1975).

Chaetogaster sp.

Ontario: St. Lawrence Great Lakes.

There are at least four species that may be expected in Canada.

Gen. *Amphichaeta*

Ontario: An unidentified species, St. Lawrence Great Lakes (but see *Phallodrilus hallae* - Tubificidae).

The single American record of this genus in the literature (*A. americana* Chen) has never been confirmed.

Gen. *Paranais*

Paranais litoralis (Müller, 1784)

Northwest Territories: Martin River (Wiens et al. 1975).

Ontario: St. Lawrence Great Lakes. Mostly a saltwater species.

New Brunswick, Nova Scotia: Cook and Brinkhurst 1973.

Paranais frici Hrabe, 1941

Ontario: St. Lawrence Great Lakes.

Gen. *Specaria*

Specaria josinae (Vejdovsky, 1883)

British Columbia: N.E. inlet, Marion Lake, Vancouver (I. Efford).

Ontario: St. Lawrence Great Lakes.

Gen. *Uncinais*

Uncinais uncinata (Ørsted, 1842)

Northwest Territories: Trail River (Wiens et al. 1975).

British Columbia: Marion Lake, Vancouver (I. Efford).

Alberta: Bow River, Calgary (R. Kussat).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Wabigoon Lake, Dryden, St. Lawrence River
Maitland, Lake Superior Fort William (T. W. Beak),
St. Lawrence Great Lakes.

Quebec: Lake St. John (T. W. Beak).

New Brunswick: St. John River below Fredericton
(G. Gillis).

Ophidonais serpentina (Müller, 1773)

British Columbia: Okanagan Lake (O. Saether).

Ontario: Cataraqui Bay, Lake Ontario (Acad. Nat. Sci.
Philadelphia), Lake Superior, Port Arthur, Kam River,
Fort William, St. Lawrence River Maitland (T. W.
Beak), St. Lawrence Great Lakes.

A monotypic genus. The single species is probably widespread.

Gen. *Nais*

Nais communis Piguet, 1906

Northwest Territories: Harris River, Martin River,
Trail River (Wiens et al. 1975).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Kam River, Fort William, St. Lawrence River
Maitland (T. W. Beak), Cataraqui Bay Lake Ontario
(Acad. Nat. Sci. Philadelphia), St. Lawrence
Great Lakes.

Quebec: Lake St. John (T. W. Beak).

Nais variabilis Piguet, 1906

Northwest Territories: Harris River, Trail River
(Wiens et al. 1975).

British Columbia: Okanagan Lake (O. Saether).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Little Church Bay, St. Lawrence River,
Cataraqui Bay Lake Ontario (Acad. Nat. Sci.
Philadelphia), St. Lawrence Great Lakes.

Quebec: Lake St. John (T. W. Beak).

These two common species are difficult to diagnose from preserved material. The various descriptions in the literature may have become confused, and a detailed analysis is required.

Nais simplex Piguet, 1906

Yukon: Porcupine River (Wiens et al. 1975).

Northwest Territories: Harris River, Martin River,
Trail River (Wiens et al. 1975).

British Columbia: Okanagan Lake (O. Saether).

Ontario: Little Church Bay, St. Lawrence River
(Acad. Nat. Sci. Philadelphia), St. Lawrence
Great Lakes.

Nais bretscheri Michaelsen, 1899

Ontario: Speed River, Wellington Co. (D. D. Williams).

Nais pardalis Piguet, 1906

British Columbia: Okanagan Lake (O. Saether).

Ontario: Cataraqui Bay Lake Ontario (Acad. Nat. Sci. Philadelphia), St. Lawrence Great Lakes.

Nais elinguis Müller, 1773

British Columbia: Okanagan Lake (O. Saether).

Alberta: Lac La Biche (R. Nursall - Mr. Pinsent),
N. Saskatchewan River, Edmonton (C. G. Patterson).

Ontario: Little Church Bay, St. Lawrence River
(Acad. Nat. Sci. Philadelphia), St. Lawrence
Great Lakes.

New Brunswick: Molus River, Kent Co. (F. P. Ide).

Nais pseudobtusa Piguet, 1906

Northwest Territories: ? Martin River (Wiens et al.
1975).

British Columbia: Okanagan Lake (O. Saether).

Nais behningi Michaelsen, 1923

Northwest Territories: Martin River, Harris River
(Wiens et al. 1975).

Ontario: Speed River, Wellington Co. (D. D. Williams).

The only other *Nais* species mentioned by Brinkhurst (1964) was *N. barbata* but the original citation of this record is unknown. Harman (1973) described *N. magnaseta* from Texas which has long teeth on the needles as in *N. elinguis*, but there are intermediate teeth present.

Gen. *Slavina*

Slavina appendiculata d'Udekem, 1855

Northwest Territories: Harris River, Trail River
(Wiens et al. 1975).

British Columbia: Okanagan Lake (O. Saether).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Wabigoon Lake Dryden, Lake Superior Port
Arthur, St. Lawrence River Ottawa (T. W. Beak),
St. Lawrence Great Lakes.

Quebec: Lake St. John (T. W. Beak).

The other species in the genus are recorded from South America.

Gen. *Vejdovskyella*

While *V. comata* (Vejdovsky, 1883) is reported from Michigan and *Vejdovskyella* sp.? from Washington, the species recorded from the St. Lawrence Great Lakes has been identified as *V. intermedia* (Bretscher, 1896). The differences between *comata* and *intermedia* have become less obvious with the description of various subspecies or variants of an intermediate nature. Brinkhurst and Jamieson (1971) concluded that there is a single variable species, for which the name *comata* takes precedence, but American specimens should be examined with care. Cook (pers. comm.) identified *V. comata* from Lake Winnipeg.

A second species, *V. hellei* Brinkhurst, 1971, is recorded from brackish water on the Alaskan shore and could well be present in Canada.

Gen. *Arcteonais*

Arcteonais lomondi (Martin, 1907)

British Columbia: ? Okanagan Lake, Osoyoos Lake (O. Saether).

Saskatchewan: Wollaston Lake (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Wabigoon Lake Dryden, Lake Superior Port Arthur, Kam River Fort William, Lake Ontario Millhaven (T. W. Beak), Speed River Wellington Co. (H.B.N. Hynes), St. Lawrence Great Lakes.

Quebec: Lake St. John, Ottawa River/St. Lawrence River Senneville (T. W. Beak).

This is another monotypic genus.

Gen. *Stylaria*

Stylaria lacustris (Linnaeus, 1767)

Northwest Territories: Great Slave Lake (D. S. Rawson), Campbell Creek, Martin River, Trail River (Wiens et al. 1975).

British Columbia: Okanagan Lake (O. Saether).

Alberta: Beaver Lake, Lac La Biche (R. Nursall - Mr. Pinsent).

Saskatchewan: Lake Athabaska (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Costello Lake Algonquin Park (D. Webb),
Lake Nipigon (Royal Ontario Museum), Cataraqui
Bay Lake Ontario (Acad. Nat. Sci. Philadelphia),
St. Lawrence River Maitland, Lake Superior
Port Arthur, Kam River Fort William (T. W. Beak),
St. Lawrence Great Lakes.

Quebec: Ottawa River - St. Lawrence River Senneville
(T. W. Beak).

The second species recorded from North America
(*S. fossularis* Leidy 1852) is now regarded as no
more than a form of *S. lacustris*, both forms being
found together in many habitats in both Europe and
North America.

The genus is monotypic.

Gen. *Piguetiella*

Piguetiella michiganensis Hiltunen, 1967, has been
reported from Lake Michigan and Lake Ontario. The
other species in the genus is not known from North
America.

Gen. *Dero*

Dero (*Aulophorus*) *furcatus* (Müller, 1773)

Ontario: Wabigoon Lake, Dryden (T. W. Beak).

Dero (*Dero*) *digitata* (Müller, 1773)

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Wabigoon Lake Dryden, St. Lawrence River
Maitland (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Gatineau River Chelsea (U.S. Nat. Mus. 26354*),
Lievre River, Ottawa River (T. W. Beak).

Dero (*Dero*) *nivea* Aiyer, 1929

Quebec: Gatineau River Chelsea (U.S. Nat. Mus. 26354).

Two other *Dero* species, *D. (D.) obtusa* and *D. (A.) vagus*
are quite likely to be found in Canada.

*U.S. National Museum catalogue number.

Gen. *Pristina*

Pristina plumaseta Turner, 1935

Ontario: Speed River, Wellington Co. (H.B.N. Hynes).

Pristina idrensis Sperber, 1948
(? = *Pristina longidentata* Harman, 1965)

Northwest Territories: Harris River (Wiens et al.
1975).

Pristina foreli (Piguet, 1906)

Northwest Territories: Harris River, Trail River,
Martin River (Wiens et al. 1975).

Two further species, *P. aquiseta* Bourne, 1891 and
P. leidyi Smith, 1896 (sensu Harman and McMahan 1975)
should be found in Canada. Other North American
members of the genus are but doubtfully recorded.

Fam. TUBIFICIDAE

Gen. *Tubifex*

Tubifex tubifex (Müller, 1774)

Northwest Territories: Lake, Schooder Channel (Wiens
et al. 1975).

British Columbia: Williams Lake (G.G.E. Scudder),
Okanagan Lake, Skaha Lake, Osoyoos Lake (O. Saether).

Alberta: North Saskatchewan River Edmonton (C. G.
Patterson), Bow River Clagary (R. Kussat), Kananaskis
Reservoir, Upper Kananaskis Lake, Gap Lake, Ghost
Reservoir (D. S. Rawson).

Saskatchewan: Qu'Appelle River (W. Warwick).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Lake Nipigon (Royal Ontario Museum),
St. Lawrence Great Lakes.

New Brunswick: St. John River, Woodstock to Edmundston
(W. Watt et al. 1973).

Newfoundland: Rennie's River St. John's (J. R. Pickavance).

Tubifex kessleri americanus Brinkhurst and Cook, 1966

Northwest Territories: Great Slave Lake (D. S. Rawson),
Campbell Creek, East Channel (Wiens et al. 1975).

Alberta: Lake Athabaska (D. S. Rawson).

Saskatchewan: Cree Lake (D. S. Rawson).

Ontario: Lake Nipigon (Royal Ontario Museum), Lake
Superior Terrace Bay (T. W. Beak), St. Lawrence
Great Lakes.

New Brunswick: St. John River system, First Green
Lake, Second Falls pond above Edmundston (W. Watt
et al. 1973).

Tubifex ignotus (Stolc, 1886)

Ontario: Lake Superior Port Arthur, Kam River Fort
William (T. W. Beak), Costello Lake Algonquin Park
(D. Webb), Hanlan's Point Toronto Harbour (author),
St. Lawrence Great Lakes.

Tubifex nerthus Michaelsen, 1908
(= *Tubifex newfei* Pickavance and Cook, 1971)

New Brunswick: St. John River, Public Landing (G. Gillis).

Newfoundland: Rennies River St. John's (J. R. Pickavance
and D. G. Cook 1971), Nat. Mus. Nat. Sci. 3456-8*.

A brackish water species in most localities.

Tubifex newaensis (Michaelsen, 1903)

Ontario: St. Lawrence Great Lakes.

Tubifex pseudogaster (Dahl, 1960) has been reported
from the Atlantic seaboard, as has another marine
species, *Tubifex longipenis* Brinkhurst, 1965, found
in Maine and likely to be reported from Canada. There
are no known freshwater species that might be expected
to be added to the list for this genus.

Gen. *Limnodrilus*

Limnodrilus hoffmeisteri Claparède, 1862

This species is found in practically every locality
in which Tubificidae are present. Detailed localities
are not reported here for this reason.

Limnodrilus udekemianus Claparède, 1862

Northwest Territories: Great Slave Lake (D. S. Rawson), Mackenzie Delta (Wiens et al. 1975).

British Columbia: Lake La Hache, Carum Lake, tributary of the Fraser River, Williams Lake (G.G.E. Scudder), Okanagan Lake (D. S. Rawson), (O. Saether).

Alberta: Bow River Calgary (R. Kussat), N. Saskatchewan River, Edmonton (C. G. Patterson).

Saskatchewan: Qu'Appelle River (W. Warwick), Lake Athabaska (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Little Church Bay St. Lawrence River (Acad. Nat. Sci. Philadelphia), Wabigoon Lake Dryden, St. Lawrence River Maitland, Lake Superior Port Arthur (T. W. Beak), Lake Nipigon (Royal Ontario Museum), St. Lawrence Great Lakes.

Quebec: Lake St. John, St. Francis River, Lievre River, Ottawa River-St. Lawrence River Senneville (T. W. Beak).

New Brunswick: St. John River Greenwich (G. Gillis), St. John River above Edmundston (W. Watt et al. 1973).

Newfoundland: Exploits River (Fisheries Dept.).

Limnodrilus claparedeianus Ratzel, 1868

Northwest Territories: Great Slave Lake (D. S. Rawson), Mackenzie Delta (Wiens et al. 1975).

British Columbia: Springhouse Williams Lake, Pavilion Lake (G.G.C. Scudder), Osoyoos Lake, Okanagan Lake (O. Saether).

Alberta: N. Saskatchewan River Edmonton (C. G. Patterson), Bow River Calgary (R. Kussat).

Saskatchewan: Lake Athabaska, Mountain Lake, Drope Lake, Otter Lake, Nist Lake (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Lake Nipigon (Royal Ontario Museum), Wabigoon Lake Dryden (T. W. Beak), Costello Lake Algonquin Park (D. Webb), St. Lawrence Great Lakes.

New Brunswick: St. John River Beechwood, Grand Falls, Tobique River (W. Watt et al. 1973).

Limnodrilus profundicola (Verrill, 1871)

Northwest Territories: Great Slave Lake (D. S. Rawson), Mackenzie Delta (Wiens et al. 1975).

British Columbia: Okanagan Lake (D. S. Rawson).

Alberta: Kananaskis Reservoir (D. S. Rawson), Bow River Calgary (R. Kussat), Lac La Biche (R. Nursall - Mr. Pinsent), N. Saskatchewan River Edmonton (C. G. Patterson).

Saskatchewan: Qu'Appelle River (W. Warwick), Mountain Lake, Lake Athabaska (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Costello Lake Algonquin Park (D. Webb), Lake Nipigon (Royal Ontario Museum), St. Lawrence Great Lakes.

New Brunswick: Tobique River (W. Watt et al. 1973).

Limnodrilus cervix Brinkhurst, 1963

Ontario: St. Lawrence Great Lakes (also Ottawa River - Acad. Nat. Sci. Philadelphia).

Limnodrilus angustipenis Brinkhurst and Cook, 1966

Manitoba: Lake Winnipeg (O. Saether).

Ontario: St. Lawrence Great Lakes.

New Brunswick: St. John River Woodstock (W. Watt et al. 1973 - unconfirmed).

Limnodrilus maumeensis Brinkhurst and Cook, 1966

Ontario: St. Lawrence Great Lakes.

The western species *Limnodrilus silvani* Eisen, 1879 has yet to be reported from British Columbia.

Gen. *Peloscolex*

Peloscolex ferox (Eisen, 1879)

Ontario: Cataraqui Bay Lake Ontario (Acad. Nat. Sci. Philadelphia), St. Lawrence River Maitland, Lake Superior Port Arthur, Kam River Fort William (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Lake St. John, Ottawa River - St. Lawrence River Senneville (T. W. Beak).

Peloscolex freyi Brinkhurst, 1965

Manitoba: Lake Winnipeg (O. Saether).

Ontario: St. Lawrence Great Lakes.

Peloscolex multisetosus (Smith, 1900)

Ontario: St. Lawrence Great Lakes (two subspecies are recorded).

Peloscolex superiorenensis Brinkhurst and Cook, 1966

Ontario: St. Lawrence Great Lakes.

New Brunswick: Tobique River (unconfirmed) (W. Watt et al. 1973).

Peloscolex variegatus Leidy, 1851

Ontario: St. Lawrence Great Lakes.

There are six marine *Peloscolex* species in the Northeast United States (Cook and Brinkhurst 1973), most if not all of which will be recorded from Canada. Thus far only *P. benedeni* (Udekem, 1855) from St. Andrews, New Brunswick, and *P. apectinatus* Brinkhurst, 1965, from Halifax Harbour, Nova Scotia (U.S. Nat. Mus. 32621) are recorded for certain.

Two species might be added to the Canadian list eventually, *P. carolinensis* Brinkhurst, 1965 (from N. Carolina) and *P. oregonensis* Brinkhurst, 1965 from Oregon. *Peloscolex beetoni* Brinkhurst, 1965, is thus far known only from Lake Tahoe.

Gen. *Isochaeta*

Isochaeta hamata (Moore, 1905)

This species was first recorded from the Acushnet River, New Bedford, Mass., and has never been found since. A record by W. Watt et al. (1973) from Second Falls pond above Edmundston must be regarded as doubtful, as no specimen was available for confirmation, and the original locality was in a brackish water part of the river. No other known species in this genus are likely to be recorded.

Gen. *Ilyodrilus*

Ilyodrilus templetoni (Southern, 1909)

Northwest Territories: ? Lake, Schooner Channel,
Mackenzie Delta (Wiens et al. 1975).

British Columbia: Marion Lake Vancouver (I. Efford),
Okanagan Lake, Skaha Lake (O. Saether).

Alberta: Lac la Biche (R. Nursall - Mr. Pinsent),
Gap Lake, Horseshoe Reservoir, Ghost Reservoir
(D. S. Rawson).

Saskatchewan: Wollaston Lake, Cree Lake, Mountain
Lake, Drope Lake, Lake Athabaska (D. S. Rawson),
Qu'Appelle River (W. Warwick).

Ontario: St. Lawrence Great Lakes.

Ilyodrilus perrieri Eisen, 1879

British Columbia: ? Okanagan Lake (D. S. Rawson).

Specimens from the Rawson collection may belong to
this poorly known species, or to another western
species, *Ilyodrilus frantzi* Brinkhurst, 1965
(Brinkhurst and Jamieson 1971). Two unidentified
species were found in Lake Winnipeg (Cook - pers.
comm.).

Gen. *Psammorectides*

Psammorectides curvisetosus Brinkhurst and Cook, 1966

Ontario: St. Lawrence Great Lakes.

Two Californian species, *P. californianus* Brinkhurst,
1965, and *P. (?) minutus* Brinkhurst, 1965, may be
found in the western provinces.

Gen. *Potamothrinx*
(= *Euilyodrilus*)

Potamothrinx bavaricus (Öschmann, 1913)

Ontario: Lake Ontario Millhaven (T. W. Beak), St.
Lawrence Great Lakes.

Potamothrinx moldaviensis Vejnovsky and Mrázek, 1902

Ontario: St. Lawrence River Prescott (Acad. Nat. Sci.
Philadelphia), St. Lawrence River Maitland (T. W.
Beak), St. Lawrence Great Lakes.

Potamothrinx vej dovskyi (Hrabe, 1941)

Ontario: St. Lawrence River Maitland, Lake Ontario
Millhaven, Bronte (T. W. Beak), St. Lawrence
Great Lakes.

Potamothrinx hammoniensi s (Michaelsen, 1901)

Ontario: St. Lawrence Great Lakes.

Potamothrinx bedoti (Piguet, 1913)

Ontario: St. Lawrence Great Lakes.

The distinction between *P. bavaricus* and the similar *P. bedoti* was thought to be limited to a difference in the segments in which the reproductive organs are located, but several authors have now clearly substantiated the separation (Timm, 1970 for e.g.). No other known species are likely to occur.

Gen. *Rhyacodrilus*

Rhyacodrilus coccineus (Vejdovsky, 1875)

Northwest Territories: Great Slave Lake (D. S. Rawson),
Campbell Creek (Wiens et al. 1975).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Terrace Bay Lake Superior (T. W. Beak),
St. Lawrence Great Lakes.

Quebec: River Bend, Saguenay River (U.S. Nat. Mus.
33023).

Rhyacodrilus montana (Brinkhurst, 1965)

Northwest Territories: Great Slave Lake (D. S. Rawson).

British Columbia: Marion Lake Vancouver (I. Efford).

Saskatchewan: Wollaston Lake, Cree Lake, Lake
Athabaska (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Costello Lake Algonquin Park (D. Webb),
Lake Nipigon (Royal Ontario Museum), St. Lawrence
Great Lakes.

Rhyacodrilus sodalis (Eisen, 1879)

Northwest Territories: Jean Marie River (Wiens et al. 1975).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: St. Lawrence Great Lakes.

Only *Rhyacodrilus brevidentatus* Brinkhurst, 1965, from Lake Tahoe need be added to complete the North American list.

Gen. *Bothrioneurum*

Bothrioneurum vej dovskyanum Stolc, 1888

Ontario: St. Lawrence Great Lakes.

Quebec: Lake St. John, Ottawa River - St. Lawrence River Senneville (T. W. Beak).

This is the only known North American species in the genus.

Gen. *Branchiura*

Branchiura sowerbyi Beddard, 1892

Ontario: Speed River (H.B.N. Hynes).

Speed River south of Guelph, Thames River south of London (Ont. Water Res. Comm.), St. Lawrence Great Lakes.

This monotypic genus is widely distributed in warm climate zones and is often introduced into aquaria, tropical plant houses and heated effluents. It also occurs in colder situations, however, where it does not seem to reach the same size.

Gen. *Aulodrilus*

Aulodrilus limnobius Bretscher, 1899

Manitoba: Lake Winnipeg (O. Saether).

Ontario: St. Lawrence River Maitland, Lake Ontario Millhaven (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Lake St. John, St. Francis River (T. W. Beak).

Aulodrilus americanus Brinkhurst and Cook, 1966

Northwest Territories: Gullies Channel, Mackenzie Delta (Wiens et al. 1975).

British Columbia: Okanagan Lake (O. Saether), Marion Lake, Vancouver (I. Efford).

Saskatchewan: Cree Lake, Wollaston Lake, Lake Athabaska (D. S. Rawson).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Lake Nipigon (Royal Ontario Museum), Wabigoon Lake Dryden, St. Lawrence River Maitland, Kam River Fort William, Lake Ontario Millhaven (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Saguenay River Jonquiere, Ottawa River-St. Lawrence River Senneville (T. W. Beak).

New Brunswick: Glazier Lake above Edmundston (W. Watt et al. 1973).

Aulodrilus pigueti Kowalewski, 1914

British Columbia: Okanagan Lake (O. Saether), Marion Lake Vancouver (I. Efford).

Manitoba: Lake Winnipeg (O. Saether).

Ontario: Costello Lake Algonquin Park (D. Webb), Wabigoon Lake Dryden, St. Lawrence River Maitland, Lake Ontario Millhaven (T. W. Beak), St. Lawrence Great Lakes.

Quebec: Ottawa River-St. Lawrence River Senneville (T. W. Beak).

Aulodrilus pluriseta (Piguet, 1906)

British Columbia: Okanagan Lake (O. Saether).

Ontario: St. Lawrence River Maitland, Lake Superior Port Arthur, Kam River Fort William, Lake Ontario Millhaven (T. W. Beak).

Quebec: Lake St. John (T. W. Beak).

There are no other known North American species.

Gen. *Phallodrilus*

Phallodrilus hallae Cook, 1975

Ontario: St. Lawrence Great Lakes (L. Superior type locality).

The other species of this genus that may be found in Canada are marine.

The genera *Adelodrilus*, *Clitellio*, *Limnodriloides*, *Monopylephorus*, *Smithsonidrilus*, together with several species of *Peloscolex*, *Tubifex*, and *Phallodrilus* are marine, the species present in the northeast of the United States being described by Cook and Brinkhurst 1973. The only other known genus likely to be recorded in Canada is the western *Telmatodrilus* Eisen. The genus is poorly known, having only been rediscovered in 1966 after the original description of *T. vejdvskyi* in 1879, a second species, *T. mcgregori*, being meagerly described in 1900 but subsequently overlooked by many authors. Holmquist (1974b) published an account of specimens collected in Alaska in 1964-70, which are attributable to *Alexandrovina onegensis* Hrabe, 1962, a species which I regard as possibly a third member of the genus *Telmatodrilus*. Holmquist advances little more than polemics to support the maintenance of the genus *Alexandrovina*, which Hrabe extended to include *A. ringulatus* (Sokolskaja). The latter had been erroneously described as a *Peloscolex* because of the papillation of the body wall, which both these species show. While papillation of the body wall is a useful character, there are genera in the Oligochaeta that contain specimens with and without papillae, and as these matters are simply one of judgment, I prefer to be consistent and regard it as a generic character of secondary importance. The one really significant finding is that there are a number of species (the four already mentioned plus two from Lake Pedder, Tasmania - *T. multiprostatus*, *T. pectinatus*) which share the unique characteristic (for tubificids) of multiple small prostate glands. The presence of spermatozoeum (the term now used for what the English literature frequently referred to as spermatophores - see Brinkhurst and Jamieson 1971, p 33) in *Alexandrovina* and their absence in *Telmatodrilus* is suggestive of a real separation, as noted (op. cit. p 533).

Grouping these species together does have the tactical advantage of drawing to the attention of subsequent authors the need to consider several characters very carefully once well preserved material becomes available - which is not often the case when other people's material is accepted for identification.

Holmquist did note the presence of pectinate posterior setae (or more accurately setae with brush-like tips) in specimens I regard as belonging to *T. vej dovskyi*, the type species, rather than to *M. mcgregori*. These two differ in the positioning of the spermathecal pores, a character not always recorded in the literature, and which has been shown to vary through wide limits in one or two species. There are two *Telmatodrilus* species in Lake Pedder, and it is possible that there are two in California which may be found further north. The third species, whether it be placed in *Telmatodrilus* or *Alexandrovina*, may also be reported from northern Canada as well as Alaska.

Two new species of the Tubificidae (Tubificinae) were found by Dr. D. G. Cook in material from the Mackenzie system (Wiens et al. 1975).

Other Families

Of the remaining families in the Suborder Tubificina, the Phreodrilidae are restricted to the southern hemisphere (the single record in Ceylon being the only exception), and the Dorydrilidae are European with some poorly known species of the doubtfully placed genus *Lycodrilus* being endemic to Lake Baikal. The Opistocystidae consist of the single genus *Opistocysta* with two North American species. The family was recently revised by Harman (1970).

The larger family Enchytraeidae differs from the rest of the suborder in that it seems to be comprised of species that have more or less successfully invaded terrestrial situations. This development is parallel to that in the third suborder, the Lumbricina, in which the aquatic Alluroididae and Glossoscolecidae are overshadowed by the terrestrial families Lumbricidae, Megascolecidae and Eudrilidae, few of which are obligatory aquatic species, plus the terrestrial representatives of the Glossoscolecidae. There are marine enchytraeids, as demonstrated by Lasserre (1971) and Cook and Brinkhurst (1973), and freshwater species that may often be overlooked. The aquatic Oligochaeta of Char Lake, the site of an IBP study in the production/freshwater section, were restricted to species belonging to this family. As the family has yet to be subject to a modern revision, and the American species in particular have received very little attention, they are excluded from this account.

The Aeolosomatidae are now excluded from the Oligochaeta (Brinkhurst and Jamieson 1971). There are few American records (Brinkhurst and Cook 1966) and none that I am aware of from Canada.

KEYS TO FAMILIES AND SPECIES

The distinction between the families of aquatic oligochaetes is simple in practice but difficult to describe in key form without drawing attention to internal characters present only in sexually mature specimens. Every effort is made in this guide to make possible the identification of species as rapidly as possible by external characters present in all specimens. For this reason, the key to the Tubificidae proceeds directly to species rather than first separating the genera.

DESCRIPTION OF FAMILIAL CHARACTERISTICS

Lumbriculidae

Fairly robust worms. Prostomium with or without proboscis. Setae from segment II in four bundles, a pair of setae in each bundle. Setae simple-pointed or bifid. No hair setae; no genital setae.

Dorsal blood vessel often provided with blind-ending lateral vessels. Testes variable in number and position, usually two pairs in succeeding segments. Atria in both testicular segments, or in posterior testicular segments when each provided with two male funnels and vasa deferentia. Ovaries one or two pairs posterior to testes. Spermathecae variable in number and position.

Haplotaxidae (Canadian forms only)

Long, thin worms, up to 400 mm. Prostomium long, divided by a transverse furrow. Setae mostly single, four per segment apart from developing replacement setae. Dorsal setae small, absent from many posterior segments. Ventral setae large, sickle-shaped. Testes paired in X and XI. Atria absent, male pores in front of ventral setae of XI and XII. Ovaries paired in XII and XIII. Spermathecae paired (?VI) VII-IX, with short ducts.

Only one American species, identity not yet confirmed, probably *Haplotaxis gordioides gordioides* (Hartmann, 1821)
? = *Haplotaxis forbesi* Smith, 1918.

Naididae

Delicate, transparent worms, length mostly measured in millimeters. Worms often capable of swimming. Asexual reproduction by budding - forming chains - or by fragmentation.

Prostomium with or without proboscis. Eyes present or absent. Ventral setae from II, an indefinite number. Dorsal setae from II, or IV, V or VI, or further back, or totally missing (*Chaetogaster*). Dorsal setae resemble ventral setae, or differ in having hair setae and simple-pointed or bifid setae termed needles. Sexual forms, when present, with one pair of testes, one pair of ovaries in IV-V, V-VI or VII-VIII. Male funnels in segment with testes, vasa deferentia penetrate septum to reach atria in ovarian segments. No penes. Spermathecae in testis bearing segment.

Tubificidae

No proboscis. No eyes. Less robust than Lumbriculidae but more robust than Naididae, often measuring 1-3 cm. No swimming but worms frequently coiling into a grub-screw shape. Gills only in *Branchiura* (dorsal and ventral filaments not around anus). Dorsal setae from II. Setae either similar in all bundles, or dorsal bundles with hair setae. When hair setae present, other dorsal setae frequently pectinate. Mature specimens with one pair of testes, one pair of ovaries, in X and XI or displaced by a few segments, atria in ovarian segments. Penes often present, sometimes with elaborate cuticular sheaths or ventral setae of spermathecal segment or penial segment often modified, usually only one such reproductive aid in any species. Spermathecae in testes bearing segment. Reproductive organs sometimes displaced forward.

SUMMARY

Key to Aquatic Families

- 1 Setae single or paired in each bundle.....2
Setae more abundant in each bundle.....3
- 2 Setae paired, simple-pointed or bifid Lumbriculidae (plus
robust Glossoscolecidae, Lumbricidae, etc.)
Setae single (or with replacement setae); dorsal setae
smaller than sickle-shaped ventrals, or missing in a varying
number of segments Haplotaxidae
(one species, ? *H. gordioides*)
- 3 Small delicate worms that may swim, may have eyes, may have
a proboscis on prostomium, may form chains of individuals,
may have dorsal setae missing from anterior segments;
reproductive organs in two segments between IV and VIII
Naididae
Larger worms that don't swim, but may coil into grub-screw
shape; no eyes, no proboscis, no chains of individuals,
dorsal setae start in II
Reproductive organs usually from X-XI Tubificidae

GUIDE TO THE SPECIES OF LUMBRICULIDAE

Species	Length (mm)	Breadth (mm)	Prostomium	Proboscis	Setae	Male pores	Spermathecal pores	Other Characteristics
<i>Lumbriculus variegatus</i> (Fig. 1-3)	to 100 mm	1.5	a long cone	-	bifid	pair VIII or X	4 pairs from X or XII	green pigment on anterior segments common
<i>Stylodrilus heringianus</i> (Fig. 4-5)	25-40	0.7-1.0	shorter than broad, rounded	-	bifid	pair on X	pair on IX	penes long, projecting. resembles a larger tubificid; common in the St. Lawrence Great Lakes
<i>Ecilipidrilus lacustris</i> (Fig. 6-8)	35-50	0.8-1.4	truncate cone as long as broad at base	-	simple- pointed	single median on X	single median on IX	recorded very infrequently
<i>Kincaidiana hexatheca</i> (Fig. 10-12)	45-50	0.7-1.3	with proboscis	long, pseudo segmented	bifid in few anterior segs., simple- pointed on rest	pair on IX	3 pairs on IX-XI	Penes protrusible, a western species

GUIDE TO THE SPECIES OF NAIDIDAE

- 1 Ventral setae only, dorsal setae absent *Chaetogaster*....2
Dorsal and ventral setae present.....3
- 2 Worms up to 25 mm long; longest setae of II usually
longer than 200 μ (Fig. 15, 16) *Chaetogaster diaphanus*
Worms up to 7 mm long; longest setae of II 140-165 μ
(Fig. 17-18) *Chaetogaster cristallinus*
- 3 Dorsal setae from V or VI.....4
Dorsal setae from II.....*Pristina*...24
- 4 With gills posteriorly (Figs. 63, 67, 71, 75).....*Dero*....5
Without gills.....7
- 5 Elongate ciliate projections (palps) associated with gills
(Figs. 71, 75) *Dero Aulophorus furcatus*
Gills without ciliate projections.....*Dero Dero*....6
- 6 Distal tooth of needle longer than proximal (Fig. 66)
One pair small dorsal gills, three pairs larger gills
(Fig. 63) *Dero Dero digitate*
Needle teeth equally long (Fig. 68)
Gills short, 3 pairs, with branchial fossa prolonged
(Fig. 67) *Dero Dero nivea*
- 7 Dorsal bundles with hair setae.....8
Dorsal bundles without hair setae.....20
- 8 With a proboscis on prostomium (Fig. 60).....9
Without a proboscis.....10
- 9 Dorsal bundles with 8-18 hair setae, 9-12 hair-like
needles *Arcteonais lomondi*
Dorsal bundles with 1-3 hair setae, 3-4 simple-pointed
setae *Stylaria lacustris*
- 10 Hair setae of VI very long needles with slightly distended
tips (Fig. 49), body encrusted with foreign material
Slavina appendiculata
No elongate hair setae, no foreign material.....11
- 11 Hair setae strongly serrated (Fig. 53)
Vejdovskyella comata
Hair setae non-serrate.....12
- 12 Needles stout, curved double pointed, 2-6 per bundle,
2-6 hair setae per bundle, ventral setae all alike,
5-10 per bundle (Figs. 19, 20) *Specaria josinae*
Needles fine, not strongly curved, single or double-
pointed (or if stout and curved, simple-pointed
Setae fewer per bundle.....*Nais*...13

13	Needles simple-pointed.....	14
	Needles bifid.....	16
14	Ventral setae of II-V with long thin teeth, the upper very long, the lower half as long or less and closely applied to the upper (at least basally), or vestigial (Fig. 47)	
	<i>Nais behningi</i>	
	Ventral setae without such elongate upper teeth.....	15
15	Needle setae with broad blunt tip (Fig. 30), anterior ventral setae with upper teeth nearly twice as long as lower, posterior ventral setae with teeth more or less equally long (Figs. 28, 29)	
	<i>Nais simplex</i>	
	Needle setae hair-like with thin tip (Fig. 43), anterior and posterior ventral setae with upper teeth one and one half times longer than lower (Figs. 41, 42)	
	<i>Nais pseudobtusa</i>	
16	Ventral setae of at least some segments behind V with some thickened setae or a single giant seta in some bundles, the lower tooth short or rudimentary (Figs. 34, 35).....	17
	No thickened or giant setae.....	18
17	Thickened setae from VII, some setae single, giant setae with reduced lower teeth (Fig. 34)	
	<i>Nais bretscheri</i>	
	Thickened setae from VI (Fig. 35), no giant setae	
	<i>Nais pardalis</i>	
18	Needle teeth long and approximately parallel	
	<i>Nais elinguis</i>	
	Needle teeth short, diverging.....	19
19*	Stomach widening gradually	<i>Nais communis</i>
	Stomach widening abruptly	<i>Nais variabilis</i>
20	Dorsal setae begin in V.....	<i>Paranais</i> ...21
	Dorsal setae begin in VI.....	22
21	Upper tooth of ventral setae always longer than lower	<i>Paranais frici</i>
	Upper tooth of ventral setae longer than lower anteriorly, but shortening until teeth equally long posteriorly	<i>Paranais litoralis</i>
22	Dorsal setae one per bundle, broad with rounded or bifid tip (Fig. 21)	<i>Ophidonais serpentina</i>
	Dorsal setae bifid, more abundant.....	23

*This distinction is difficult. The author feels that a detailed study of these two species is required.

- 23 Eyes present, setae with upper tooth longer and
thinner than lower *Uncinais uncinata*
Eyes absent, setae with upper tooth equal to or
shorter than lower *Piquetiella michiganensis*
- 24 Prostomium without proboscis, needle teeth long,
parallel, upper slightly shorter than lower *Pristina idrensis*
Prostomium with proboscis, needle teeth short
and equal or upper longer than lower.....25
- 25 Needle teeth fine, equal *Pristina foreli*
Upper tooth of needles slightly longer and thicker
than lower *Pristina plumaseta*

GUIDE TO THE SPECIES OF TUBIFICIDAE

- 1 Posterior segments with dorsal and ventral gill
filaments (Fig. 189) *Branchiura sowerbyi* 2
Gills absent..... 2
- 2 Hair setae present, at least in anterior dorsal bundles.. 3
Hair setae absent..... 21
- 3 Body wall covered with a crust of cuticular material
together with foreign material, often in the form of
papillae.....*Peloscolex* (in part)... 4
Body wall naked..... 7
- 4 Papillae in two rows per segment (Fig. 131), up to 14
hair setae in anterior bundles *Peloscolex multisetosus*
Papillae, when fully developed, thickly and evenly
covering most of the body..... 5
- 5 All ventral setae bifid (Figs. 123, 124)
Peloscolex ferox
At least some anterior ventral setae simple-pointed..... 6
- 6 Simple-pointed setae only in ventral bundles of II-IV,
other ventral setae not abnormally curved (Figs. 136-
138), spermathecal setae absent *Peloscolex variegatus*
Simple-pointed setae in ventral bundles of II-VIII or
IX, each bundle with one simple-pointed seta and one
bifid
Posterior ventral setae strongly recurved, with reduced
upper teeth (Figs. 142-145), spermathecal setae present
Peloscolex carolinensis
- 7 Pectinate setae absent, dorsal setae bifid or with
extra upper tooth..... 8
Pectinate setae present..... 10
- 8 Dorsal setae with the upper teeth shorter than the
lower, sometimes replicate (Fig. 194)
Aulodrilus pluriseta
Dorsal setae not of this form..... 9
- 9 Mid and posterior dorsal bundles beyond VII with hairs
and oar-shaped setae (Fig. 193) *Aulodrilus pigueti*
No oar setae, dorsal bundles with short bent hair
setae, bifid setae with somewhat rounded teeth
Potamothrinx vej dovskyi
- 10 Genital setae present in mature specimens, cuticular
penis sheaths absent..... 11
Genital setae absent, cuticular penis sheaths present... 16

- 11 Several blunt-tipped penial setae in ventral bundles of XI with tips closely applied (Figs. 179, 185)
Coelom full of coelomocytes.....*Rhyacodrilus*.. 12
Hollow-tipped spermathecal setae present in ventral bundles of VII or X (Figs. 171, 174, 175, 176)
Coelomocytes absent.....*Potamothrrix* (in part).. 14
- 12 Lateral teeth of pectinate setae very long, almost parallel, intermediate teeth indistinct, very thin (Fig. 182) *Rhyacodrilus sodalis*
Pectinate setae with diverging teeth, upper tooth usually thinner than lower, pectinations distinct (Figs. 177, 180)..... 13
- 13 Hair setae elongate in II, upper tooth of pectinate setae longer than lower (Fig. 180), hair setae present throughout *Rhyacodrilus montana*
Hair setae of II not elongate, often absent beyond median segments, pectinate setae with upper tooth as long as or a little longer than lower (Fig. 177) *Rhyacodrilus coccineus*
- 14 Spermathecal setae elongate (Fig. 174) *Potamothrrix hammoniensis*
Spermathecal setae relatively short and broad (Figs. 175, 176)..... 15
- 15 Testes and ovaries in VIII-IX, spermathecal pores in VIII (Fig. 176), male pores in IX, genital setae in VII-IX *Potamothrrix bedoti*
Testes and ovaries in X-XI, spermathecal pores in X (Fig. 175), male pores in XI, spermathecal setae in X *Potamothrrix bavaricus*
- 16 Hair setae very long and thin, much longer than the very narrow body *Tubifex ignotus*
Hair setae not exceptionally long..... 17
- 17 Pectinate setae with long parallel lateral teeth, few intermediate teeth (Fig. 103) *Tubifex nerthus*
Pectinate setae with obvious intermediate teeth of varying thickness (Figs. 93, 106, 132, 146, 150)..... 18
- 18 Penis sheaths very thin-walled, tub-shaped, appearing granular (Fig. 95) *Tubifex tubifex*
Penis sheaths elongate, conical, or cylindrical, somewhat more obvious (Figs. 109, 135, 149)..... 19
- 19 Penis sheaths cylindrical with reflected proximal end (Fig. 135) *Peloscolex superiorensis*
Penis sheaths regular or irregular cone shape..... 20

- 20 Penis sheaths broad at base, narrowing abruptly,
with pointed distal end, lateral opening (Fig. 109)
Tubifex kessleri americanus
Penis sheaths truncate cones (Fig. 149)
Ilyodrilus templetoni
(plus ? *I. perrieri*)
- 21 Inhabiting mud tubes, anterior setae simple-pointed,
posterior setae broadly palmate (Figs. 195, 196)
Aulodrilus americanus
Not in mud tubes, setae bifid..... 22
- 22 Prostomium with mid-dorsal pit (Fig. 188), spermathecae
absent, sperm in spermatophores* attached externally
with coelomocytes *Bothrioneurum vej dovskyanum*
No prostomial pit, no spermatophores, with spermathecae,
no coelomocytes..... 23
- 23 Genital setae present in mature specimens..... 24
Genital setae absent..... 27
- 24 Ventral penial setae on XI, single-pointed, distally
hooked (Fig. 199) *Phallodrilus hallae*
Ventral spermathecal setae on X (Figs. 128, 168, 171)... 25
- 25 Spermathecal setae large, broad (Fig. 171), no cuticular
penis sheaths (Fig. 172) *Potamothrrix moldaviensis*
Spermathecal setae thin, thin cuticular penis sheaths
present (Fig. 126)..... 26
- 26 Posterior ventral setae strongly recurved with upper
teeth reduced (Fig. 167), penis sheaths thin, indistinct
Psammoryctides curvisetosus
Posterior ventral setae with upper teeth thinner than
but more or less as long as lower (Fig. 125), penis
sheaths bluntly conical with reflected base (Fig. 126)
Peloscolex freyi
- 27 Cuticular penis sheaths absent in mature specimens;
up to 10 setae per bundle with upper teeth thinner and
shorter than the lower, median and posterior setae
with lateral keels (Figs. 191-192)
Aulodrilus limnobius
Cuticular penis sheaths present in mature specimens,
setae fewer, without lateral keels..... 28
- 28 Penis sheaths short, tub-shaped (Fig. 101)
Tubifex newaensis
Penis sheaths more or less elongate, cylindrical..... 29

*as distinct from spermatozeugma found in spermathecae

- 29 Anterior setae (at least) with upper teeth much longer than the lower (Fig. 113); penis sheaths relatively short (Fig. 114) *Limnodrilus udekemianus*
Anterior setae with upper teeth varying from shorter than to longer than lower, but not as markedly so as above; penis sheaths usually longer, or elaborately spade-shaped (*L. silvani*, Fig. 112)
Other *Limnodrilus* species

The remaining *Limnodrilus* species are best identified by close comparison with the illustrations of penis sheaths (Figs. 112, 115-119). Intermediate forms between *claparedeinus* and *cervix* are found, as are variants of *L. hoffmeisteri*. Some of these may be caused by hybridization, but detailed study of the genus is still required.

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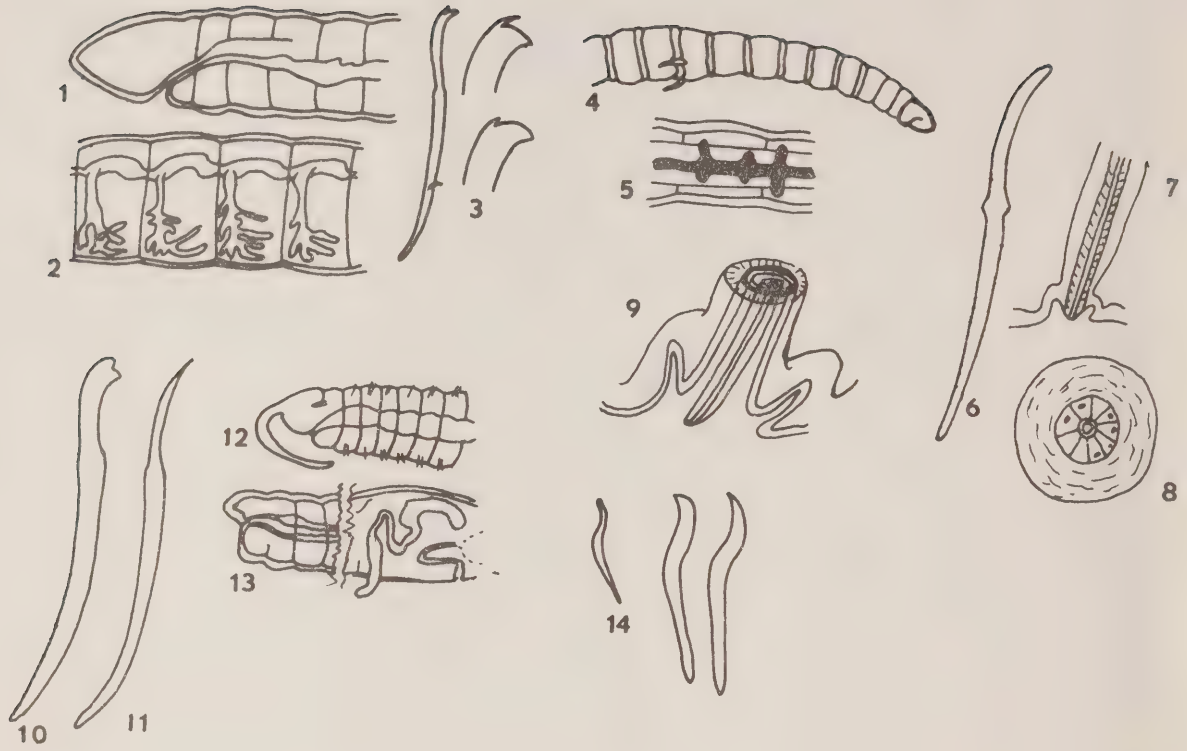


Plate 1

Plate 1. Lumbriculidae, Haplotaxidae

- Lumbriculus variegatus*: 1 anterior end with conical prostomium
2 blind-ending lateral blood vessels of one side,
posterior segments
3 setae
- Stylodrilus heringianus*: 4 anterior end, paired penes on X
5 dorsal view of mid-dorsal blood vessel of
posterior segments with short lateral vessels
- Ecilipidrilus lacustris*: 6 seta
7-8 longitudinal and transverse sections of penis
- Ecilipidrilus daneus*: 9 longitudinal section of penis
- Kincaidiana hexatheca*: 10 anterior seta
11 posterior seta
12 anterior end showing proboscis
- Kincaidiana freidris*: 13 anterior end without proboscis, protrusible penes
on VIII
- Haplotaxis gordioides*: 14 small dorsal, large ventral setae

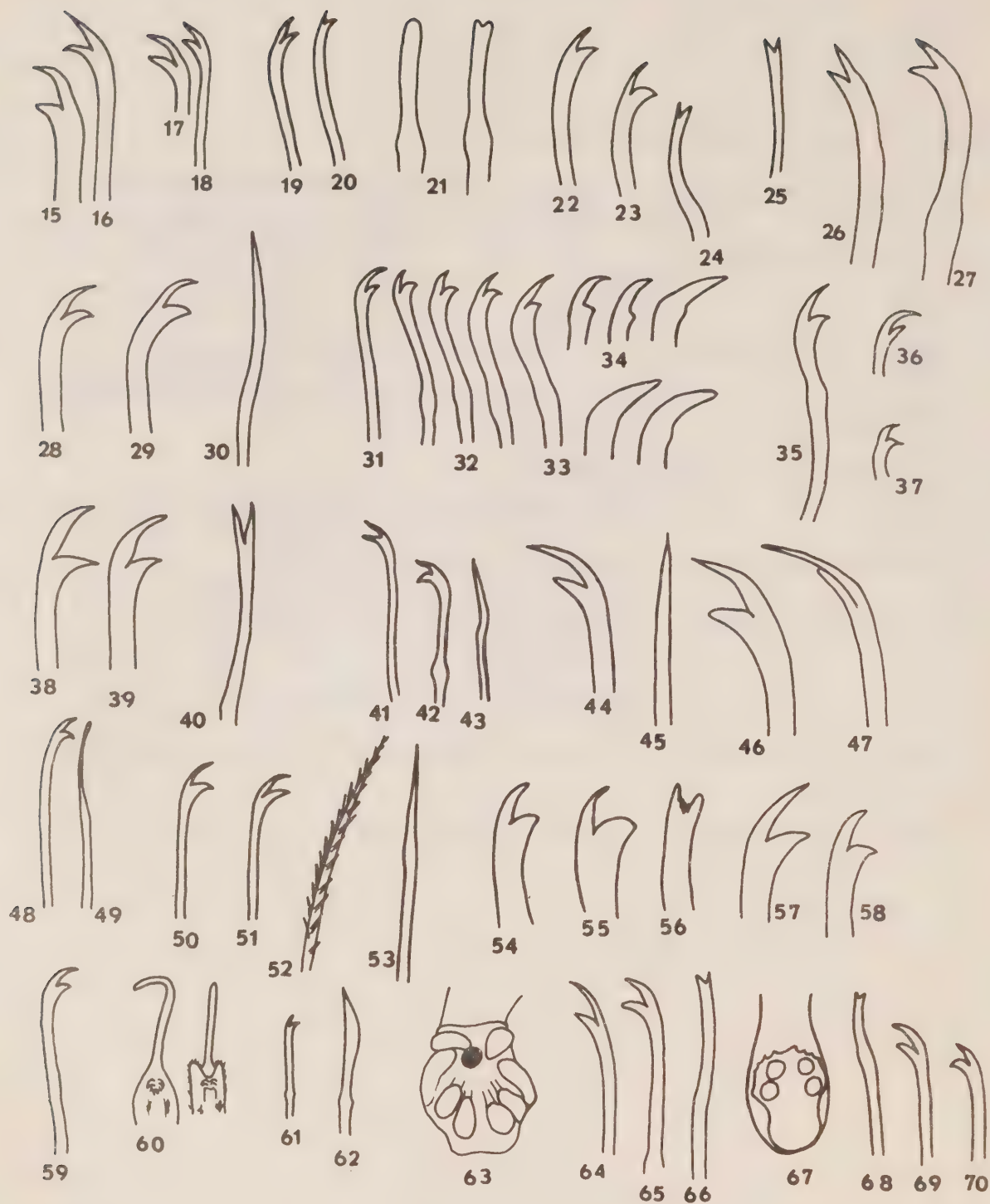


Plate 2

Plate 2. Naididae (*Chaetogaster*, *Specaria*, *Ophidonais*, *Nais*, *Slavina*,
Vejdovskyella, *Arcteonais*, *Stylaria*, *Piguetiella*, *Dero*)

Chaetogaster diaphanus: 15-16 ventral seta of II and VI

Chaetogaster cristallinus: 17-18 ventral seta of II and VI

Specaria josinae: 19-20 ventral seta and dorsal seta

Ophidonais serpentina: 21 dorsal setae

Nais communis: 22-24 ventral seta of II, of posterior segment and dorsal seta

Nais variabilis: 25-27 dorsal seta of VI, ventral seta of II, and of VI

Nais simplex: 28-30 ventral seta of II of posterior segment, dorsal seta

Nais bretscheri: 31-34 (left to right) ventral seta of II, three setae from XV, normal seta of VIII, heads of various thickened or giant setae of VI-XI

Nais pardalis: 35-37 thick seta from VI (left), ventral seta of II (upper right), posterior ventral seta (lower right)

Nais elinguis: 38-40 ventral seta of II (left), posterior ventral seta, dorsal seta (right)

Nais pseudobtusa: 41-43 ventral seta of II, posterior ventral seta, dorsal seta

Nais behningi: 44-47 ventral seta of II (right) dorsal seta, ventral seta of XIV, another anterior ventral seta (right)

Slavina appeniculata: 48-49 posterior ventral seta, dorsal seta

Vejdovskyella comata: 50-53 ventral seta of II posterior ventral seta, serrate hair seta, dorsal seta

Vejdovskyella hellei: 54-56 anterior ventral seta, posterior ventral seta, dorsal seta

Arcteonais lomondi: 57-58 anterior and posterior ventral setae

Stylaria lacustris: 59-60 seta and two alternative forms of proboscis and prostomium

Piguetiella michiganensis: 61-62 ordinary seta and modified spermathecal seta (after Hiltunen, 1967)

Dero (Dero) digitata: 63-66 retracted posterior gills around anus, anterior and posterior ventral setae, dorsal seta

Dero (Dero) nivea: 67-70 gills, dorsal seta, anterior and posterior ventral setae

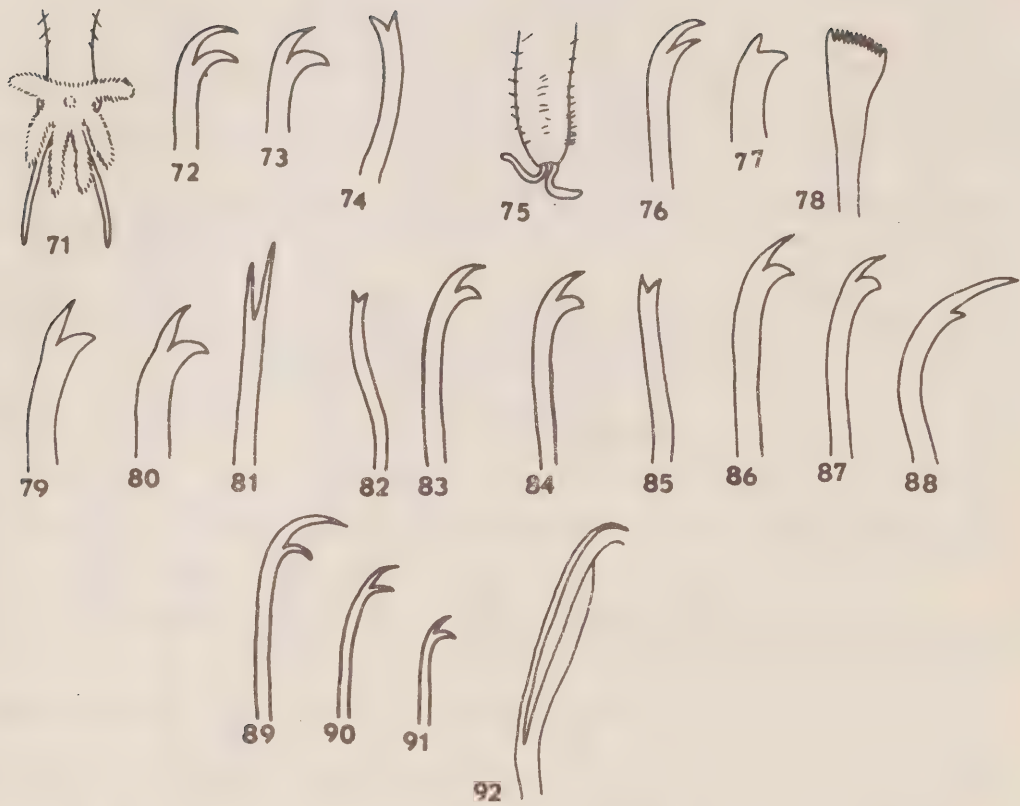


Plate 3

Plate 3. Naididae (*Dero Aulophorus*, *Pristina*)

Dero (Aulophorus) furcatus: 71-74 gills anterior and posterior ventral setae and dorsal seta

Dero (Aulophorus) vagus: 75-78 gills anterior and posterior ventral setae, dorsal seta

Pristina idrensis: 79-81 ventral setae of II and of posterior segment, dorsal seta

Pristina foreli: 82-84 dorsal seta, anterior and posterior ventral setae

Pristina aequisetata: 85-88 dorsal seta, ventral setae of II, IX and giant seta of V

Pristina leidy: 89-92 ventral seta of II, III and posterior bundle, genital seta of VI (after Harman and McMahan, 1975)

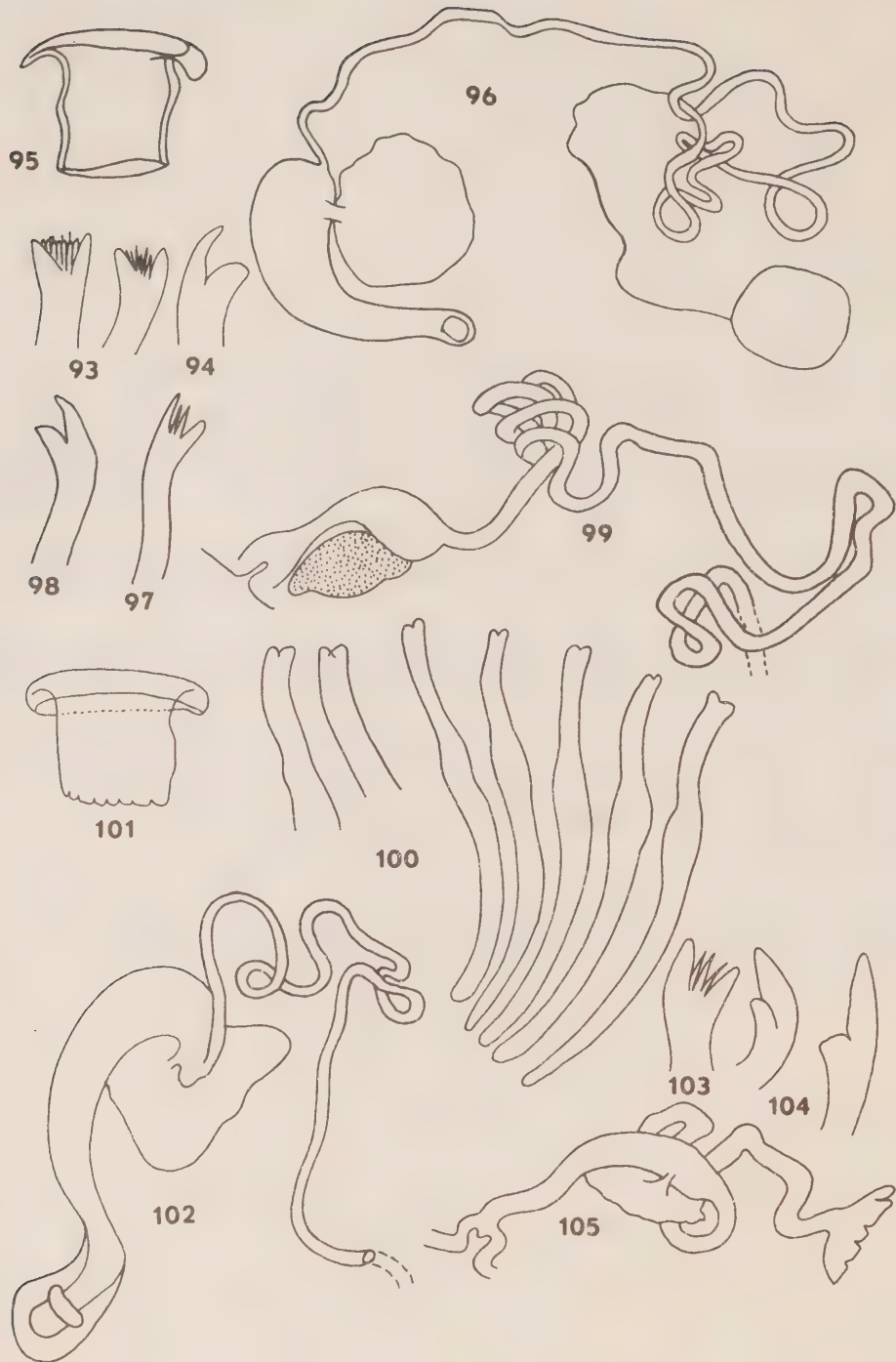


Plate 4

Plate 4. Tubificidae (*Tubifex* - in part)

Tubifex tubifex: 93 dorsal pectinate setae
94 ventral anterior setae
95 penis sheath
96 male ducts (atrium to left, male funnel to right)

Tubifex ignotus: 97 dorsal pectinate seta
98 ventral seta
99 male ducts (atrium left, vas deferens to right)

Tubifex newaensis: 100 setae
101 penis sheath (Russian specimen)
102 male duct (atrium to left)

Tubifex nerthus: 103 dorsal pectinate seta
104 anterior ventral setae
105 male ducts (European specimen)



Plate 5. Tubificidae (*Tubifex*, *Limnodrilus*, *Isochaeta*, *Peloscolex* and *Ilyodrilus*)

Tubifex kessleri americanus: 106-109 dorsal seta, anterior and posterior ventral setae, penis sheath

Limnodrilus hoffmeisteri: 110-111 head of penis sheath, whole penis sheath (typical form)

Limnodrilus silvani: 112 penis sheath

Limnodrilus udekemianus: 113-114 seta and penis sheath

Limnodrilus angustipenis: 115 penis sheath

Limnodrilus maumeensis: 116 penis sheath (head)

Limnodrilus claparedeianus: 117 penis sheath - front and side views of head

Limnodrilus cervix: 118 head of penis sheath

Limnodrilus profundicola: 119 penis sheath

Isochaeta hamata: 120-121 anterior and posterior dorsal setae

Peloscolex ferox: 122-124 dorsal pectinate seta, anterior and posterior ventral setae

Peloscolex freyi: 125-127 setae, penis sheath and spermathecal seta

Peloscolex multisetosus: 128-131 pectinate seta, anterior and posterior ventral setae, anterior end of whole worm

Peloscolex superiorensis: 132-135 dorsal pectinate seta, anterior and posterior setae, penis sheath

Peloscolex variegatus: 136-138 ventral setae of II-IV, II-X, posterior seta

Peloscolex oregonensis: 139-141 anterior setae, seta of V and posterior seta

Peloscolex carolinensis: 142-145 ventral setae of VII, X, XII, XV

Ilyodrilus templetoni: 146-149 dorsal seta of V, anterior and posterior ventral setae, penis sheaths as usually seen and entire

Ilyodrilus perrieri: 150-151 pectinate dorsal seta, ventral seta

Ilyodrilus frantzi: 152-153 seta, penis sheath

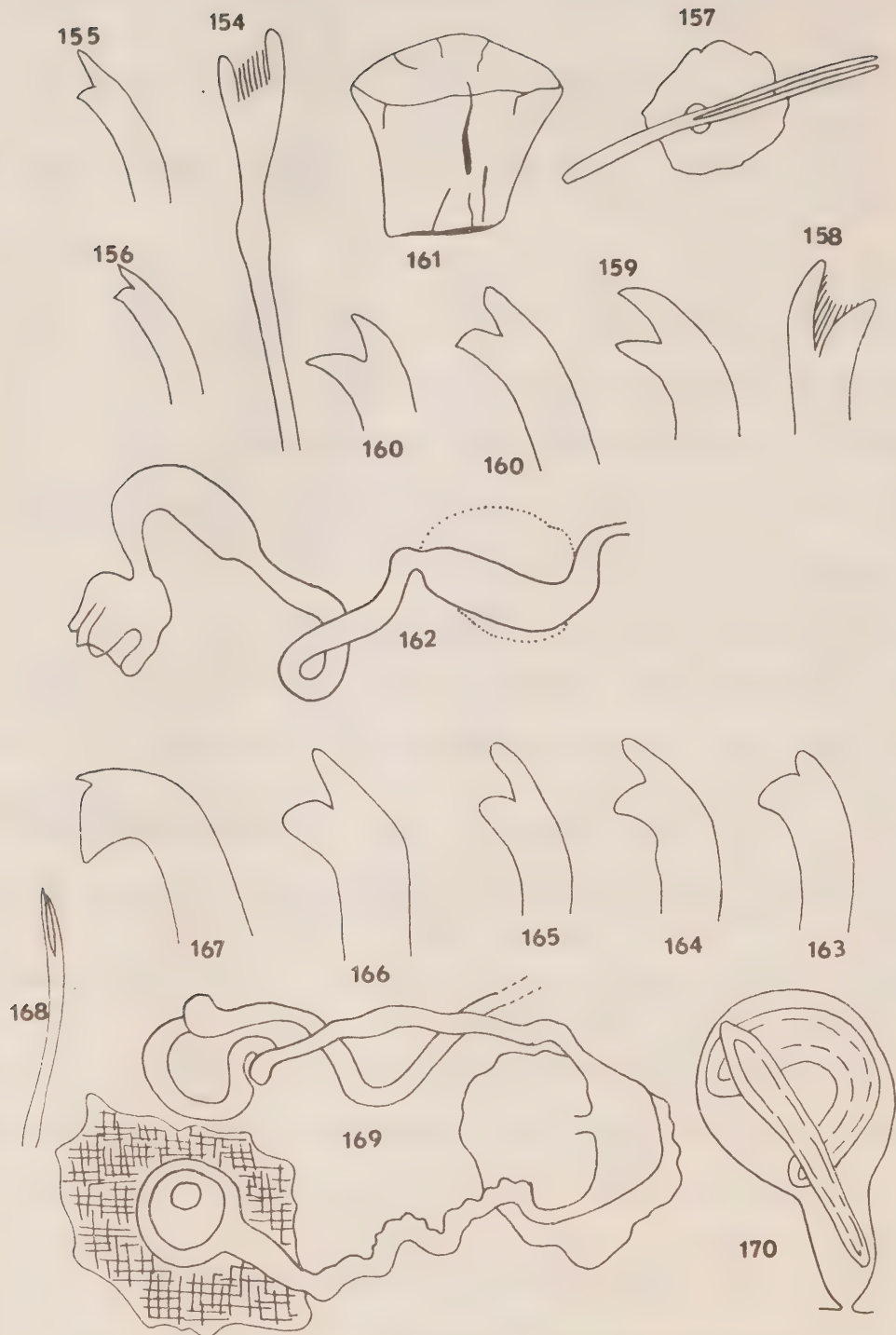


Plate 6

Plate 6. Tubificidae (*Psammoryctides*)

Psammoryctides californianus: 154-157, 162 dorsal seta, anterior and posterior ventral seta, spermathecal seta, male duct

Psammoryctides minutus: 158-161 dorsal seta, ventral setae of anterior and posterior segments, penis sheath

Psammoryctides curvisetosus: 163-170 setae of II, III, IV, median and (smaller scale) posterior segments, spermathecal seta, male duct and spermatheca

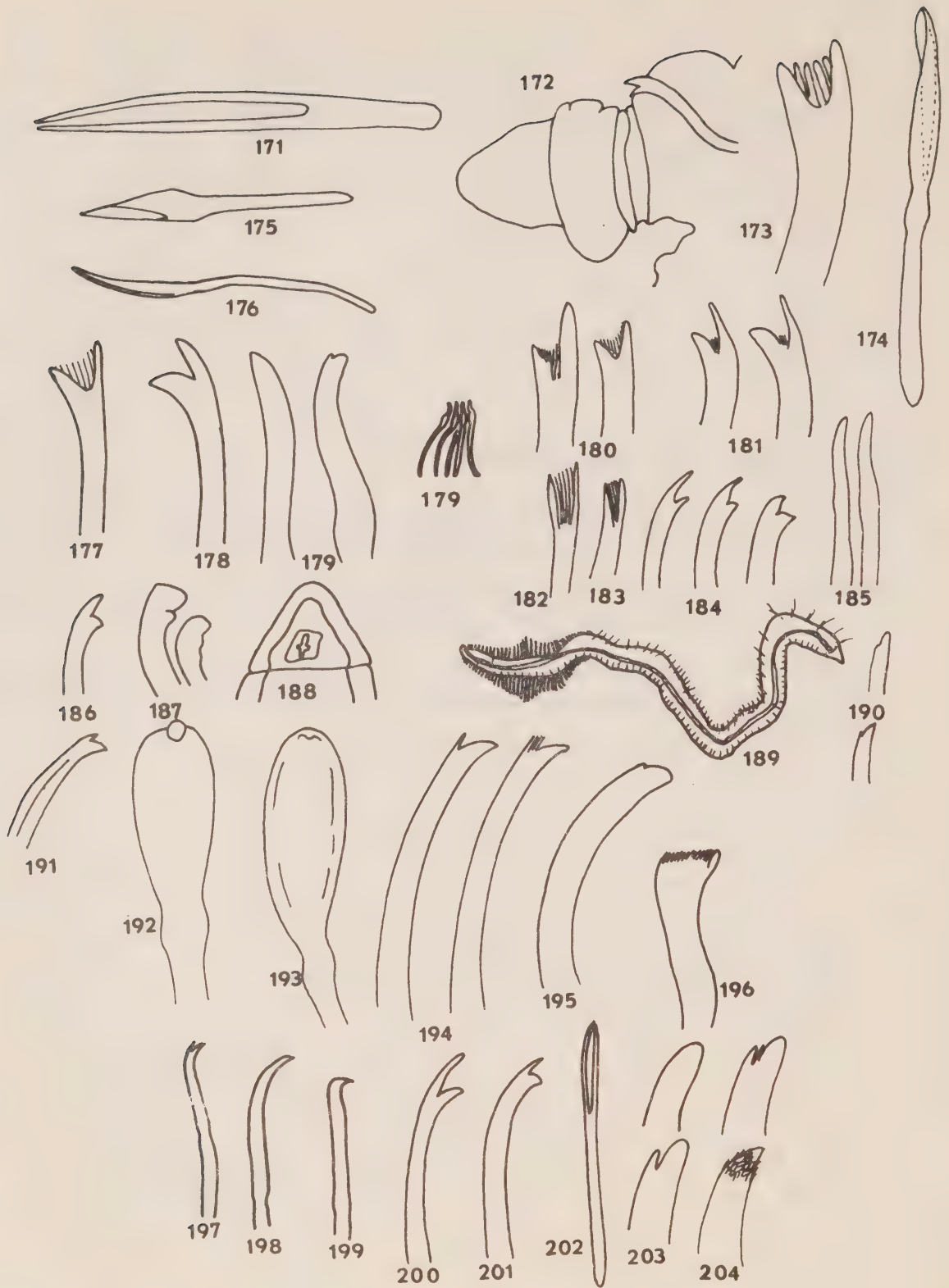


Plate 7

Plate 7. Tubificidae (*Potamothenix*, *Rhyacodrilus*, *Bothrioneurum*, *Branchiura*,
Aulodrilus, *Alexandrovina*, *Telmatodrilus*, *Phallodrilus*)

Potamothenix moldaviensis: 171-172 spermathecal seta, penis

Potamothenix hammoniensis: 173-174 pectinate seta, spermathecal seta

Potamothenix bavaricus: 175 spermathecal seta (after Timm 1970)

Potamothenix bedoti: 176 spermathecal seta (after Timm 1970)

Rhyacodrilus coccineus: 177-179 pectinate seta, ventral seta, penial
setae - heads and a bundle

Rhyacodrilus montana: 180-181 pectinate seta, pectinate ventral setae

Rhyacodrilus sodalis: 182-185 anterior and posterior pectinate setae,
anterior, mid and posterior ventral setae, penial setae

Bothrioneurum vejdoskianum: 186-188 ventral seta, penial setae,
prostomium showing dorsal opening

Branchiura sowerbyi: 189-190 whole worm showing posterior gills, setae

Aulodrilus limnobius: 191-192 side and face view of seta, median segment,
showing lateral wings

Aulodrilus pigueti: 193 oar-shaped seta

Aulodrilus americanus: 195-196 anterior and median dorsal setae

Phallodrilus hallae: 197-199 anterior and posterior setae, penial seta
(after Cook and Hiltunen 1975)

Telmatodrilus (? *Alexandrovina*) *onensis*: 200-202 anterior and posterior
ventral setae, spermathecal seta (202 after Holmquist 1974)

Telmatodrilus vejdoskii (? *mcgregori*): 203-204 anterior and posterior
setae (after Holmquist 1974)

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